



Evaluation of Cyber Products:
Involvement of Technology Users in Product Development

**Prepared in completion of Cyberstep Task 3,
To be updated with inclusion of partner evaluation plans, as
developed**

Contents

Overview of Formative Research	1
Strategic Stakeholder Involvement	2
Cost-effective Research Strategies	2
Rich, Systematic and Timely Data on Strategically Significant Questions	5
Representing Product Users and Stakeholders	8
Specific Formative Research Strategies Pertinent to Cyberstep Concerns .	20
Issues regarding Product Use.....	20
Issues regarding Product Function.....	28
Issues regarding Product Outcomes.....	33
Issues regarding Needed Support	35
Issues regarding Product Framework	39
Proposal for How Formative Research Can Assist the Developers	40
Technical Appendices	42
A. Formative Evaluation Questions and Themes	43
B1. Specific Research Issues Related to Learner Characteristics	45
B2. Aspects of Standards Frameworks Likely to be Influenced by Adult Learner User Group Characteristics.....	50
C. Matching Research Method to User Group Issue	52
D. Formative Evaluation Structure Worksheet.....	55
E. Report of Initial Conversations with Developers Re. Formative Evaluation	56
Tables	
1. Project Objectives and Research Questions Requiring User Involvement	7
2. Categories of Users to be Involved in the Research	9
3. Variables Defining Cyberstep User Audience Segments Among Learners..	12
4. Variables Defining Cyberstep Audience Segments Among Learning Support Personnel	16
5. Summary of Product Use Issues for Learners	21
6. Strategies to Learn About the User from Exercises Designed into the Technology.....	26
7. Analysis of Product Function Issues	30
8. Product Outcome Issues for Instructors' Feedback	34
9. Analysis of Different Learning Contexts	36
10. Types of Observations Regarding Learning Contexts	38
11. Summary of Evaluation Input for Different Product Phases	40
12. Formative Evaluation Development Checklist	41

A Preliminary Proposal for How Technology Users Should Be Involved in Product Development

As part of the development of the Cyberstep materials, each of the partners will engage in formative research related to product utility as a basis for guiding further design. A central element in assessing product performance is observation and analysis of how Cyberstep's customers—adult learner programs and the learners they serve—make use of these resources. User groups consist of the diverse group of learners targeted as low literacy and limited in English proficiency, the instructors who work with them, stakeholders in their success from their families and communities, and program administrators. Each of these user groups has different needs, concerns and perspectives on what is important to them, what works well, and specific features that make access and use easier and more rewarding.

This paper proposes how to structure user involvement to identify specific concerns developers should take into account to maximize the utility and effectiveness of their products.¹ A basic assumption for the paper is that an important objective for Cyberstep is to assure the formative evaluation relates to product concept, navigation, look and feel, accessibility of instructional approach, content, and productivity/outcomes. The paper is structured with the following sections included:

- Overview of Formative Research Methods and Cyberstep Concerns
- Specific Formative Research Strategies for Cyberstep Concerns
- Proposal for How Formative Research Can Assist the Developers

As a result of the work on the paper, it is expected that the developers will have a plan in place involving key stakeholders in some phase of their product development.

OVERVIEW OF FORMATIVE RESEARCH

Formative research is different from some other kinds of research (e.g. summative or descriptive research) in that it solicits feedback for the purpose of making necessary changes based on that input. Formative research designs vary depending on the themes being explored, specific questions being asked, subject, available time, and types of respondents. Whatever the specific anchoring questions, however, successful formative research requires:

¹ We know that many of the partners have involved some or all of the types of users in formative evaluation for product development related to this project. This proposal relates specifically to involvement of technology users for the purposes of this project.

- strategic involvement of key stakeholders in providing feedback
- involvement of representative product users and stakeholders
- cost-effective research methods which yield the data necessary for decision making
- rich, systematic and timely data on strategically significant questions
- a strategy for applying the results of the research to guide and enhance product design

The last bullet is an important point, and both the life and death of many evaluation efforts. Formative research does not assume that the product being evaluated is frozen and untouchable. Rather the aim is make the product(s) as useful and productive as possible. The result is that research plans can, do, and should change. This does not mean they can be dispensed with. If thorough product testing is desired for certification, documentation, product improvement, or versioning, a systematic research plan is necessary in order to keep the research cost-effective.

Strategic Stakeholder Involvement

There are various points at which to involve users in product development. Stages at which their involvement has been seen most useful are, starting with the earliest stage in product development²:

- product concept
- the proof of concept (i.e. rapid prototype demonstration)
- initial development phase (alpha test)
- pre-release (beta test)
- on-going feedback (delta test)

Thinking of stakeholders as including experts in the field, instructors, learners, resource teachers, teacher trainers, administrators, paraprofessionals, and learners' family members and networks, one can see immediately that not all these stakeholders can be involved equally in each stage of product development.

Cost Effective Research Strategies

Each of the different stages of product development poses different questions of formative research and therefore call for distinct methods which involve different subsets of stakeholders. The range of data collection strategies used in formative research include³:

- paper/desk review of the product or product potential

² For more information on stages of development and the formative evaluation they require, see M. Driscoll. Web-based Training; Using Technology to Design Adult Learning Experienced (1998); S.B. Barksdale and T.B. Lund. Setting standards for evaluating Internet-based training, Multimedia & Internet Training Newsletter, 4(11), 4-5, 10.

³ **Appendix C** summarizes the appropriateness of specific methods for user groups and other associated research issues.

- surveys of potential users attitudes and product orientations, with background and experience
- interviews or one-on-one meetings
- group interviews or focus groups
- user observations employing ‘thinking-out-loud’ learner interaction strategies
- data on learners’ use of resources captured directly by the technology application
- product integrated feedback forms or mechanisms

Probably all the methods listed above are familiar to the reader. Among them, however, certain techniques tend to capture more information than others—namely, the focus groups which use oppositional interview strategies (asking members of the group to formulate pro and con responses that address each others’ concerns), user observations employing ‘thinking-out-loud’ learner interaction strategies (asking learners why they are doing something a certain way and what a specific behavior means to them), and product-integrated feedback forms used in situations where observers query learners about their performance and that performance also is captured by the application.

Strategies differ in terms of which respondent sub-group they are best suited to, the kinds of data they are best designed to provide, the extent to which they can provide information about both how the product works and why, and which product development phase they are most suited to. This is described below.

At the product concept stage, it’s useful to have experts on subject matter, learning process, technology, and the learners themselves review the concept to avoid spending money and time if the original assumptions are not viable. Multi-media products inevitably are built on a central metaphor or navigation strategy which underlies developers’ learning environment. It is crucial to test this concept early on. This is a paper/desk review from a small group of product subject matter experts and key stakeholders.

The proof of concept stage is quick test of the development strategy, for one lesson of one product. It’s useful for testing product assumptions and structure, navigational tools, central images and treatment, and user reactions to the concept in general. It is not good for testing product effectiveness, since it’s not a full implementation. Feedback on the concept and proof of concept is best from individual, key stakeholders, in an informal environment. Interviews or one-on-one meetings, and individual observations of use, are usually appropriate for this purpose, with a small number of targeted users and stakeholders.

The alpha test is the point at which the product is ready for use in full in its proper environment (i.e. as audio/video, on the web, at home, in classrooms, etc.. It is at this point that systematic feedback from learners

and teachers/facilitators is essential. Focus of the evaluation is generally on overall appeal of content, clarity of instructions, ease of use and navigation, needed support, and how users interact with the product. Results are used to enhance product usability, acceptability, effectiveness, and impact on the field. The results of the alpha test build the foundation for the pre-release version of the product—the beta test. Data collection strategies here include focus groups, data capture techniques incorporated into the technology itself, and a combination of interview with observational performance analysis. This utilizes a larger and more representative group of users for analysis than the proof of concept.

The beta test is a pre-release version, where the concept and strategies in use are set, and (hopefully) only last minute bugs are being worked out. It focuses as much on the instructor and facilitator, as the learner, to be sure the issues in roll-out are addressed successfully. Data collection strategies here are generally surveys, interviews or focus groups, and product-integrated feedback forms. Data collection integrated into the product, with the user's consent, is also a possibility. Respondents here include the range of users (often a 10% sample is used) and potential users.

Delta tests examine the importance of change in the product. While the alpha and beta tests are the traditional stages of product development, development does not stop with release of the product. If it does, the product soon becomes outmoded, and some of the investment is lost, as new designers re-invent the wheel. It's crucial to have learners and instructors continue to question and document the utility of the product as input to new or continuing developers. Capacity for passive collection and processing of ongoing feedback from learners and other stakeholders is therefore crucial. This essentially is the delta test—ongoing product implementation during which users indicate, through a variety of mechanisms, the importance of change in particular features (content, resources or functionality) or the value which would be added to the product by development of new features.

The delta test will be a particularly important consideration in development of the Web-based learning resources—because a lesson ABE and ESL learners should be expected to master early on is that the WWW is a dynamic environment where virtually all “places” are constantly evolving. In fact, current industry strategies (all of them focused on attracting and retaining site visitors or, in the case of on-line communities, “virtual residents”) suggest that web-users' expectations will increasingly be that they can find a “personal page”—that is a website which, in some fairly visible way, is configured to reflect their interests, personal style, and preferences. Thus, for Cyberstep to achieve success as a viable resource for lifelong learning it will be necessary to provide some means for securing information from a learner/user on an ongoing basis and to assure that this information will be used effectively in more or less constantly re-configuring Cyberstep for a wide spectrum

of learner/users. Data collection strategies here are generally surveys, interviews or focus groups, and product-integrated feedback forms. Data collection integrated into the product, with the user's consent, is also a possibility. Providing such feedback could be part of the learning-to-learn skills module activities.⁴

At whichever stage, however, the evaluator must be careful that the data collection strategy is appropriate to the respondent group and the decisions it is designed to inform. Appendix C summarizes the strengths of weaknesses of different data collection strategies for different respondent groups.

Rich, Systematic and Timely Data on Strategically Significant Questions

Formative evaluation often is interactive. This is an important strength and helps make the research cost-effective. It should also be integrated, that is the results from one set of data collection activities can and should influence other phases. The specific questions asked by a specific developer about his or her products at any phase will vary depending on the goals and objectives of the product itself, the audience for which it is targeted, what has been tested previously and the findings related to this product, and the work on similar products or issues on which the evaluation is building. This does not mean, however, that formative evaluation can be *ad hoc*. To the contrary, in order to be successful any formative evaluation is consciously planned and structured to provide cost-effective systematic information about:

- Product use—How the product is actually used
- Product function—How the product works in the contexts it is used,
- Product content and learner outcomes—How use affects learners' skills development,
- Product support—What support is necessary to use materials appropriately in different contexts
- Product concept—What findings from the above imply for future related products

Specifically, formative evaluation is concerned about how learners and other users needs are taken into account in product concept, navigation, look and feel, accessibility of instructional approach, product content and incorporated exercises/activities.

⁴ The Task 2 framework incorporates specifications for user input and feedback. It may, however, be desirable to expand these specifications to provide further guidance regarding ways to build user feedback into the Cyberstep curriculum, for example, as part of on-line exercises, letter-writing practice, etc.

Any research plan has to specify the key research questions related to product development priorities, the data required to answer the questions, who should provide the information, how the information should be collected, how the data collected will be used to answer the questions, and both the sufficiency of the anticipated information for answering the question and strategy for making use of the information collected. **Table 1**, on the following page, summarizes the project objectives and provides examples of specific questions relevant to developers.

The research questions listed in Table 1 are merely examples of some of the specific questions that developers will have, depending on the component of the product being tested, the phase of the product development, and the work on which the formative evaluation is based. Whatever the specific questions, a good research design is concerned with whether the information is collected in such a way that:

- the respondent group is composed of the people best equipped to give information on the issue,
- the range of potential users provide the needed input on the range of issues identified,
- the information can be provided most readily and ethically,
- the data are objective and rich enough to answer the questions posed,
- data analysis strategies are clear and can produce results in a timely fashion.

As a result of involving a representative group of users in addressing the research questions, formative evaluations should provide the data necessary to significantly, reliably and validly inform product development decisions, the understanding of the factors which affect materials functioning and success, the marketing the product to potential users, and decisions about future or further materials development.

Table 1
Key Project Objectives and Research Questions requiring User Involvement⁵

Project Objectives—Cyberstep materials should:	
1	Successfully engage adults functioning at low literacy and limited English levels in improving their literacy and language skills and capabilities.
	1.1 Are the materials appropriate?
	1.2 Are the materials considered worthwhile?
	1.3 Do the materials match up with learners' goals?
	1.4 Which features are most successful in engaging these learners?
	1.5 How do learners, instructors, and other facilitators respond to the materials components?
	1.6 How are learners and facilitators using the materials?
	1.7 How are Cyberstep materials related to other materials and integrated into instructional strategies
2	Function effectively making use of multi-media features to foster learning.
	2.1 How easy to use are the materials?
	2.2 Do learners take advantage of what specific technologies offer?
	2.3 Which pathways and resources do learners make the most use of?
	2.4 What pathways and resources might be missing?
	2.5 What is an effective time commitment to expect from users?
	2.6 What are the hardware, software, and cognitive problems that learners experience that inhibit use?
	2.7 What supports do learners use and need to use these materials effectively?
3	Have a significant, positive impact on learners' performance⁶
	3.1 Do the materials do what they claim?
	3.2 Do materials teach language and literacy, and if so which dimensions are addressed?
	3.3 What product focuses are most meaningful for learners and learning facilitators?
	3.4 In which skills development areas do learners achieve most through these materials?
4	Be useful and effective for learners and learning facilitators in different learning contexts
	4.1 What preparation is needed for instructors and facilitators to work productively with the materials
	4.2 What preparation or support is needed by learners with different learning profiles
	4.3 What problems do teachers/facilitators experience in working with learners on these materials?
	4.4 How do instructors use the materials to work with students?
5	Suggest a materials development framework beyond the current work?
	5.1 What are steps in product testing that will provide short and longer term utility?
	5.2 How can we document learning achievement?
	5.3 What technology features are important for short, medium, and longer term acceptability?

⁵ Users are learners, learners families, professional and paraprofessional instructors, as well as resource teachers and administrators in whose programs these materials may be used.

⁶ Summarizing the different perspectives embraced in the various frameworks, a common set of learning objectives might be seen in the following objectives--comprehending and producing appropriate oral and written information, communicating, listening and understanding interactions in interpersonal contexts, understanding and navigating social organizational systems, understanding and navigating technology-based systems, understanding, applying and making use of numeracy-related principles and information, understanding and conceptualizing oneself as a learner and the strategies to continue to cultivate one's own ability to use language and numeracy.

Representing Product Users and Stakeholders

This is a more complex issue than is immediately apparent because it links cost-effectiveness and statistical decisions. Of course ideally, with unlimited time, resources and patience, the developer will want to involve all stakeholders at all junctures. Reasonably, however, this is not possible, so the decision about who should be involved, the specific strategy to use to assure those selected are representative, and how many should be involved becomes a series of concerns with very high stakes. The wrong decisions on these issues can result in incomplete, biased, and, inconsequential findings, with consequences of wasted dollars, energy and time. The right decisions can result in decisions which enhance the product, its performance, attractiveness, productivity and sustainability. The key to making the right decision is appropriately defining:

- Who are product users and stakeholders?
- Who should be represented—what representative means?
- How many respondents need to be involved?

While the answers to these questions will vary, as previously indicated, based on the specific question asked, and the phase of the formative research process, it may be useful to consider the factors involved in these high stakes decisions.

Who are product users and stakeholders?

While almost anyone can be a user of the product and is a stakeholder, the decisions related to this question involve setting priorities about who it is crucially important to involve in the research. The user group includes learners, teachers and paraprofessional facilitators of adult education, and some resource professionals—i.e. resource teachers, those who train teachers, and other administrators or program designers. This is wide range of groups which would quickly add cost to the formative evaluation. While all would provide useful information, not all are crucial every step along the way.

Table 2 describes who should be involved in addressing the 5 key evaluation concerns specified on page 5 and elaborated on in Table 1, and what kinds of information they should provide, in which product phases.

Table 2
Categories of Users to be Involved in the Research,
Targeted Kinds of Information and Product Phase

Users	Targeted Kinds of Information	Product Phase
Learners	<ul style="list-style-type: none"> • Stakeholder reaction—Attitudes and Opinions • Product function—Demonstrated experience with use of media • Product usage—Product experience in different learning contexts • Learner outcomes—Demonstrated performance & product output • Product support—Demonstrated experience and opinions 	Alpha test Beta Test Delta test
Instructors and other learning facilitators	<ul style="list-style-type: none"> • Stakeholder reaction—Completed review of materials, indicating how fit with objectives for fostering literacy and language development • Product function—Observations on where learners got stuck with media features or in using materials; how the MIS functioned, and where strategies added value • Product usage—Observations of learners' experience; how they used materials; how they were able to tailor use of materials for learners. • Learner Outcomes—Review of learners' output from experience; reflection how specific learners would function with materials • Product support—Reflection on needed support, teaching and technology experience • Concept—Reflection on product integration with other materials 	Product concept Proof of concept Alpha Beta Delta
Resource professionals *	<ul style="list-style-type: none"> • Stakeholder reaction—Attitudes and Opinions; review of materials, indicating how sample lessons fit with curricula, materials, approaches specified, • Product function—Reflection on important product features • Product usage—Observation and reflection on how use materials in learning contexts • Learning outcomes—Review of learning product outputs • Product support—Response to survey items on needed instructor support 	Alpha Beta

*These are individuals who support adoption of or effective use of learning materials--Resource teachers, teacher trainers, other teacher support administrators.

While a range of information is relevant from each group, in many cases the information can be combined and integrated into two kinds of data collection tools—an observation-interview and tools incorporated as exercises and MIS into the product itself. A pivotal issue in determining the utility of the research, however, relates to how the evaluator selects respondents.

Learners—Who should be represented and what does representative mean?

With potential users being diverse in many characteristics that profoundly affect learning objectives and abilities, the high stakes issue is how to conceptualize the factors that affect differential success with the product so that the fewest number of respondents can provide the most useful information. Learners are the more difficult user group here, due to their diversity and the fact that they are the primary customer for Cyberstep materials, despite the key role played by other stakeholders, so the discussion in this section will focus first on them. The main strategy recommended for optimizing cost-effectiveness will be based on matrix-sampling techniques, utilizing techniques from television and radio marketing—audience segmentation.

The audience segment concept profiles learners in terms of factors that affect their experience of the product. These profiles (or series of factors) are termed ‘target audience or user segments’, and are subgroups of learners whose characteristics, background, experiences, and priority pressing concerns lead them to interact with instruction and instructional materials differently.

Another way of describing user segments, then, is as frameworks built from learner characteristics which have been identified by developers and evaluators to affect their interaction with the materials. These characteristics vary in terms of those which are more noticeable (and therefore more easily screened—i.e. determined directly from interaction with the learner or based on the learner’s own knowledge) and those which are less noticeable (or less easily screened). Some learner characteristics, for example, may not come into play in other instructional settings, or the learner or instructor may not be systematically conscious that the characteristic exists. Keyboarding skills is an example of such a characteristic. A key feature of the audience segmentation strategy is to identify all the important characteristics and sample on the characteristics that are the most easily determined.

Table 3 summarizes those learner characteristics we think relevant to Cyberstep product performance— both those easily screened (primary segmentation variables) and those less easily screened (underlying segmentation variables). Note that while the primary segmentation variables may not be the best measure of a factor that would affect learner interaction with the materials, if it has been used successfully as a proxy variable for others, we have recommended its use here. Each of the rows in Table 3 relates to a potential dimension of a learner segment, indicating the values for sub-groups among the respondents.⁷ While not

⁷ A variety of research has, over the past 20 years, emphasized the idea that limited-English and low-literate adults’ functional competencies cannot easily be reduced to a single dimension be it “grade level” or functional competency. At the same time, a variety of other factors which may, in general, predict competencies, have an imperfect

all rows may be relevant to every issue the developer wants to test, it's important to be cognizant of all rows in order to judge which learner variables may be important factors influencing the findings. The specific questions to be explored in any formative research effort will, of course, be customized to relate to the learning objectives, instructional methodologies, and specific content and instructional objectives of each module being tested.

relationship, evidenced statistically by the extent to which there is a good or bad fit in regression models relating various variables to functional competencies. Aguirre International's experience in applied research with limited-English and limited-literate populations is that there will be a premium on easy-to-use selection criteria for identifying audience segments (i.e. learner sub-populations). The research strategy will be, then, to use these simple (imperfect) screening criteria to assure involvement of different groups of learners and, then, subsequently securing additional, more detailed information about the characteristics of these learners to assist in interpreting the findings which emerge from the research itself, from in-take performance tests included as part of the materials themselves.

Table 3:
Variables Defining Cyberstep User Audience Segments among Learners

Screening Variable	ESL Learners Grouping Definitions	ABE Learners Grouping Definitions
Primary Segmentation Variables—Those most easily screened		
Age, In years	16-25 26-40 41-65	16-25 26-40 41-65
Educational Attainment, in grade level completed	0-3 4-6 7-12	0-9 10-12
Labor Force Status	No or minimal experience Job in immigrant sector Employed in low-skill	No or minimal experience Displaced worker – Y/N Employed in low-skill
Time in US Exposure to Eng.	Little time, Long time, home exposure Long time, work exposure	Immigrant – Y/N Idiolect – Y/N Literacy on job – Y/N
Self-Assessed Functional Competency—English	Very little or no English Some English	Ltd Experience struggles with reading Some difficulty reading
—Native language	Very little Native Lang. Lit Some Native Language literacy	Not Applicable
Prior Adult Education Experience	Yes-good Yes-bad No	Yes-good Yes-bad No
Learning location orientation	Classroom Individual learning environment	Classroom Individual learning environment
Underlying Audience Segmentation Variables—Those less easily screened		
Technology Competencies	Keyboard skills Familiarity w/ computers Familiarity w/ WWW	Keyboard skills Familiarity w/ computers Familiarity w/ WWW
Support Networks for Learning	Family members speak English Co-workers speak English Live in Immig. Enclaves –Y/N	Family support network Co-worker support network Neighborhood/Church/CBO support
Level of Motivation Learning Objectives	High-no specific objective High-specific objective Vague or Pro-Forma Discouraged/low self-esteem	High-no specific objective High-specific objective Vague or Pro- Forma/Mandated Discouraged/low self-esteem
Resources/Barriers for Skills Development	Time/Transportation Self-Directed Learning Exp. Social/Home Env.-Pos/Neg.	Time/Transportation Self-Directed Learning Exp. Social/Home Env.-Pos/Neg.

While the user segmentation strategy is complex, we believe it has definite promise for enhancing the benefits from formative research while reducing the cost. Three factors will help tame the task:

- Only primary segmentation variables are used to develop audience segments.
- Individual respondents can represent multiple categories.
- Not all user segments are necessary to explore each objective, content or functional issue.

Primary segmentation variables are relatively easy to get information about, from instructors or from the learners themselves, and, together, form a profile of a subgroup of learners who may be appropriate for product testing—depending on the objective of the test. Additional segmentation variables are issues which are harder to determine and on which data should be collected during the test. Again, depending on the relevance of the variable to the issue being tested, the developer may not need to be sure all values of any given variable are ‘covered’.

Selection of research sub-populations can be conducted, using these variables in a purposive way to recruit research subjects (e.g. either for focus group research, or individual cognitive interviews) by preferentially recruiting “two-fers”, that is, research subjects who satisfy multiple screening criteria. Age, educational attainment, and labor force participation, for example, can be correlated; so a segment relates more to profiles of learning characteristics than to a collection of single individuals representing individual values on each of the component variables. However, there are some special considerations. In particular, we recommend attention should be given to recruitment of research subjects with little or no prior experience with adult education programs and to recruitment of research subjects with unsatisfactory prior experience. There are two reasons for this. The first is quite practical. Cyberstep has particular promise for making access to lifelong learning possible to people who need services but who have not been able to access services through the regular system or whose experience in “mainstream” learning settings has been unsatisfactory. The second reason is also practical. Adult learners who have had prior successful experience in adult education programs are likely to be more flexible, more resilient, or more motivated than others who, at first glance, seem much like them. Thus, they are more likely to generate “false positives” in the formative research, i.e. saying that materials are marvelous, easy to use, and rewarding when, in fact, that is not the case. Since the objective of formative research is product improvement, special efforts to understand how to respond to the needs of the most difficult customers are particularly rewarding and are likely to make for the most cost-effective research investments.

An important objective for Cyberstep is to assure that the formative research relating to product concept, navigation, look and feel,

accessability of instructional approach, and productivity/ outcomes represent all user-audience segments.⁸ The number of audience segments can be reduced when focusing on the viability of specific content targeted to specific subgroup of learners. Success in using navigational pathways, for example, may have less to do with prior adult education experience, time in the U.S., and some of the categories of age, than it has to do with being under 25, employment status, English competency, and educational attainment.⁹ Additionally, older learners, with fewer years serve as proxies for the additional audience segment variables. However, it's important to bear in mind all the variables when deciding who to involve in testing product elements. Utilizing the Table 3 screening criteria to generate the actual distribution of interviews, observations, or focus groups, requires three decisions: the number of sub-groups which resources permit, relevance of different audience segments to the specific research questions, and the number of individuals to involve in each of the subgroups—discussed in the next section.¹⁰

Underlying User Segment Analysis variables are crucial for interpreting the data generated in this research. Users' experiences, assessment of the materials, and specific problems encountered in using Cyberstep materials require a richer, fuller characterization of learners. Information relating to each of these variables (or at least those deemed to be most critical) must be elicited from research subjects in the course of the research session. We've elaborated on the utility of these ancillary variables below.

- **Technology competencies:** These variables deserve special consideration because the most powerful Cyberstep materials are computer-based (either WWW, WebTV or CD/DVD-ROM). Learners' access to the "virtual classroom" of Cyberstep will require successful interaction with Cyberstep materials. Essentially, the recommendation that all learners be characterized in terms of technology competencies means that it will be possible to determine whether problems in using Cyberstep materials have to do with technology interactions or with content. If Cyberstep is to be a feasible mode for self-directed learning outside a structured classroom, computer laboratory, or program environment, formative research must assure adequate representation of learners with little technology familiarity. Instructors and facilitators also should be categorized in terms of technology experience, as these 'helpers' can positively impact the learners' experiences.

⁸ How to determine the number of learners to involve is discussed in the next bulleted section.

⁹ **Appendices B1 and B2** list formative research issues facing Cyberstep product developers face with the targeted ESL and ABE learners.

¹⁰ It is crucial to articulate, ahead of time, the priority research questions to be explored in the research. The strategy would benefit from multi-variate modeling across all Cyberstep tests, utilizing a core 'subject' dataset and set of research questions. We will explore the viability of this strategy.

- Support networks for learning: The variables in this row relate to the practical desirability of designing Cyberstep materials flexible enough that “informal helpers” from adult learners’ own personal networks can be recruited to provide learners with help when they “get stuck” – in using technology or in specific kinds of skills development. At the same time, Cyberstep materials will achieve maximum cost-effectiveness if they leverage high levels of learner involvement and practice – learning beyond the virtual classroom. In order to determine the adequacy of materials in allowing this sort of leveraging to take place, it is necessary to characterize the kinds of support networks research subjects have available to them. This consideration is particularly important in the formative research activities which involve observations of self-directed learning in a non-structured environment, e.g. use of WebTV versions of Cyberstep.
- Level of motivation and learning objectives: Information on learners’ participation motivations and objectives is required in order to provide a framework to explore whether or not Cyberstep materials can be made useful for the hardest-to-serve ESL and ABE learners. Of particular concern in ESL are learners for whom learning English is really a metaphor for a general fuzzily-defined desire to “get ahead” in the United States. It is possible that many ESL learners fall into this category and that they are the sub-population who find it most difficult to maintain progress in the standard ESL classroom. Inclusion of this sub-group and characterization of findings related specifically to this sub-group are important as a means to explore the degree to which Cyberstep supports learners’ articulation of viable, well-defined skills development objectives as part of a battery of “learning to learn” skills. Of particular concern in ABE are learners whose skills development efforts are, to some degree, coerced, as part of a mandated welfare-to-work program or, conceivably, as part of a court diversion program. On the one hand, this sub-population may potentially benefit greatly from using Cyberstep materials as a kind of alternative to “mainstream” alternative education in an individualized study setting or GED program. On the other hand, the coercive context of their skills development efforts may interfere with their ability to define their own learning objectives. It will be valuable to see how Cyberstep can overcome this difficulty.
- Resources and barriers to skills development: These variables serve to address concerns about how well Cyberstep materials may work in the real-world environment. Do learners who face time/transportation barriers to participating in classroom instruction seek Cyberstep as a viable resource? Do self-directed learners face problems in finding the space and calm time in a low-income household to use Cyberstep materials successfully. If there are such problems, how can product design and development best overcome

them? For example, do learners who only use Cyberstep infrequently need a higher level of review of already-covered material than those who manage to set aside time each night for using Cyberstep materials?

Additional segmentation variables are listed to assure that the evaluation research will yield results which are valid for a wide spectrum of learners. Because one of the primary aims of Cyberstep materials lies in their design potential to provide a “sheltered” environment for self-directed learning, given the many forces which make skills development difficult for real world adults in real-world situations, these additional issues are crucially important.

Learners--How many learners need to be involved?

In a formal research study there is a formula for determining how many respondents should be queried to obtain a specific level of certainty in the results. While the danger of bias is similar in formative research, there is more emphasis on qualitative data than quantitative data, in order to be sure the developer understands what a user opinion or rating is based upon. The decision making process about the tradeoff between quantity and quality is difficult, and, in practice, the issue of cost carries a lot of weight. Four elements go into deciding the number of learners required:

- Nature of the issue area
- User Audience Segmentation variables relevant
- Number of Issue Areas
- Type of data collection strategy

Issue areas can be more fundamental (e.g. product concept, navigation or content accessibility) or more specialized (e.g. appropriateness of content of specific employment modules). Fundamental concerns drive the product development and require a larger respondent set. A minimum respondent set of 40 to 60 learners is worthwhile for these basic concerns about product concept and function because it provides the developer with some foundation to make conclusions based on the data. For specialized issue areas, feedback from 8 to 12 learners in a user segment may allow sufficient conclusions about a theme.

A key principle in deciding on the number of learners to involve is that the User Audience Segment should be tailored to the research question. To do that the developer needs to consider which user characteristics are likely to affect performance on the product element being tested. For each issue area a minimum of eight learners needs to be involved.

Of course one way to save sample recruitment is to try to get the most out of every respondent. It's useful to remember here, however, that one respondent can only address about 5 themes over the course of an hour,

assuming that adequate exploration of any theme requires response to 5 direct questions.

Finally, the type of data collection strategy needs to be considered. Some methods provide general descriptive data about attitudes and behaviors; other methods provide more detailed information. Some methods provide both kinds of information. If the information being collected is very detailed, more learners are necessary in order to understand both the why and the how.

The issue of the number of learners balances the cost-effectiveness issues of quantity and quality of the data being collected. The bottom line for formative evaluation is the same question as for other research—the user of the research has to be able to rely on the validity of the findings to address the specific questions for which the data were collected; and the user has to be able to secure the information in a timely manner. If these criteria cannot be met, the strategy by definition is not cost-effective.

Instructors—Who should be represented and what does ‘representation’ mean?

In addition to learners, product users will include instructors, facilitators of learners’ work, and facilitators of instructors’ work. These terms are, by necessity, vaguer than usual because Cyberstep aims to support learners both in formal and informal settings resulting in a wide range of learning support personnel. They include, for example, professional teachers, paraprofessionals, resource teachers, tutors in library programs, literacy coaches, and family members who have taken on the role of supporting literacy enhancement and improvement, resource teachers, teacher trainers, and administrators. It’s both relevant and important to involve stakeholders in all these roles to participate in providing feedback, but not in all product development phases. **Table 4** describes appropriate screening criteria, and the information that should be sought.

Table 4:
Variables Defining Cyberstep Audience Segments among Learning Support Personnel

Screening Variable	Criteria	Feedback Focus
Primary Segmentation Variables—Those most easily screened		
Screening Variable	Criteria	Issues
Organization/ Program context	<ul style="list-style-type: none"> • Adult School • Workplace Classroom • Tutoring context • Home visit or home-based learning facilitation context 	<ul style="list-style-type: none"> • Needed and available support for the product to work in this context? • What are issues of learner access in each of these settings? • How the product can sustain engagement in each of these settings?
Role	<ul style="list-style-type: none"> • Instructor with extensive experience • New Instructor • Paraprofessional with experience • Tutor • Family Member of Support • Resource Professional* 	<ul style="list-style-type: none"> • How do the opportunities for collaboration with coaches work in this product? • What support is needed for this person to help reinforce students' learning • How does product-based reinforcement for using new skills outside the product context get used by learners?
Subject specialty/	<ul style="list-style-type: none"> • ABE • GED • ESL—Life skills, Work skills • Technology based learning 	<ul style="list-style-type: none"> • How does the content taught fit in with the curricula of the class? • How is/could the product be used in a class or with learners individually? • What value does use of the product add to learners?
Underlying Segmentation Variables for Learning Facilitators—Less Easily Screened		
Technology competence	<ul style="list-style-type: none"> • Comfortable and exploratory • Willing, not thoroughly comfortable • Tolerant, not comfortable • Resistant 	<ul style="list-style-type: none"> • What support is necessary for the facilitator to use the product? • Are there specific resources in the product that could help this user?
Classroom approach	<ul style="list-style-type: none"> • Extent product use central to approach and type of approach: • Life skills • Family Literacy • Work skills • GED 	<ul style="list-style-type: none"> • For which focuses does it fit better? • How is the output produced through the Cyberstep materials used?

*Resource Professionals include Resource teachers, teacher trainers, and administrators who directly support learning

Much the same way as with learners, instructor audience segments require the respondent to address issues which vary depending upon context, subject specialty, teaching style, and experience with teaching and technology. To qualify as an appropriate learning facilitator respondent, the individual must have recent experience and knowledge working with the learners to which the product is targeted, in one or

more of the contexts described. Fortunately, it is our experience that many instructors have had experience in more than one instructional setting, so it is quite possible to have relatively few individuals serve in ‘two-fer’ or ‘three-fer’ roles. We’ve listed technology competence and classroom approach as 2 less observable variables. While asking instructors about technology competence is fairly easy, finding the answer is more difficult. Even those who say they are reticent, may have significant skills or people resources at home who can help them. The real issue is how resourceful users are in troubleshooting and resolving problems, and this is something that may have to be found out in action rather than *a priori*. Classroom approach is similarly easy to ask about but difficult to interpret. The issue really is how the facilitators meld the classroom focus with the Cyberstep activities. This may be something to address on an activity-by-activity basis.

Instructors—How many learning facilitators need to be involved?

Instructional personnel are expert witnesses, and the aim is to use them sparingly but strategically, at key junctures of the formative evaluation. Ideally, some of these instructors or facilitators can be asked to perform desk reviews of how the content covered and the work produced relates to other work done by learners in with other materials. They can provide expert information on the support instructional facilitators need to assist learners with the materials. They can participate in the formative research as part of the learner observation, performance analysis or results interpretation. They also may be queried about the support learners need to effectively cultivate the available learning opportunities, and how learners use the opportunities provided with Cyberstep to do this.

Of course the number of instructional personnel who should be involved depends on the product phase. At the early phases (product concept and proof of concept) only three instructors need to be involved—just enough to represent the different learning settings in which the materials will be used and the different subject areas. In the alpha and beta tests, however, it is recommended that 3 individuals in each role be invited to participate in the formative evaluation, with the resulting focus group of about 10 to 12. This is premised on the possibility mentioned earlier of soliciting individuals who have experience in multiple learner support roles. These numbers are minimums. Higher numbers are more desirable, but also more expensive to include and make the research harder to manage. Key is to involve the appropriate audience segments, strategically, in the appropriate kinds of questions.

SPECIFIC FORMATIVE RESEARCH STRATEGIES PERTINENT TO CYBERSTEP CONCERNS

This section of the paper discusses issues for formative evaluation specifically related to Cyberstep's project objectives. As listed in Table 1, the primary objectives of the materials are to develop materials which:

1. Successfully engage adults functioning at low literacy and limited English levels in improving their literacy and language skills
2. Function effectively making use of multi-media features to foster learning
3. Have a significant, positive impact on learners' performance
4. Be useful and effective for learners and learning facilitators in different settings
5. Suggest a materials development framework beyond the current work

Each of these objectives brings with it formative evaluation issues—namely questions concerning product use, product function, product outcomes, needed support, and the framework for continuing development. The specific issues related to each are discussed in turn within this section.

1. Issues regarding Product Use—Successfully engaging adults functioning at low literacy and limited in English in improving their literacy and language skills and capabilities.

Nothing succeeds like success is a key strategy Cyberstep materials will pursue, based on Task 2. By saying this we mean Cyberstep materials aim to engage adults functioning at low literacy in using the materials, in learning exercises, in inquiry exercises, in improving their language skills, in noticing that improvement, and understanding how both what capabilities those new or refined skills add and how to build on them.

Questions about product use should include inquiries into what was most or least helpful, the kinds of topics and tasks that were particularly engaging, enjoyable or most frustrating, extent of engagement in the learning experience, what use was made of the designed-in multi-media capabilities, what learners and instructors got out of each task element, and how learners applied the Cyberstep experience to their own lives.

Questions about use of content knowledge, skills and strategies should be tied to learners expressed interests and goals (mismatches between what learners said they wanted to learn and what they managed to learn and enjoyed learning) should prove particularly interesting.

Table 5 summarizes usage issues for learners and the kinds of data collection strategies that might be used to collect data on the issues

Table 5
Summary of Product Use Issues for Learners

Issue	Methods*
<ul style="list-style-type: none"> Learning technology medium: Success of different technologies (video, web, print, etc.) for specific purposes; success of different technology elements for different purposes—success in terms of learner response, instructor response, and performance 	Sample Task Completion, Performance Observation, Performance product analysis, Participant interviews
<ul style="list-style-type: none"> Patterns of use: Types of interaction with specific multi-media options, tasks and activities –e.g. just browsed, responded to questions, initiated or created work, explored. 	Designed-in usage capture, Sample Task Completion, Performance product analysis
<ul style="list-style-type: none"> Types of exercises, learning experiences: Success of different learning experience types for specific skills development purposes—success in terms of learner response, instructor response, and performance 	Sample Task Completion, Performance Observation, Performance product analysis, Participant interviews or feedback forms
<ul style="list-style-type: none"> Engagement: Levels of engagement—amount of time spent, pattern of time spent, on what kinds of activities or types of interaction 	Designed-in usage capture, Sample Task Completion, Performance product analyses, Participant interviews
<ul style="list-style-type: none"> Course structure: Success of different navigational pathways for specific learners in specific contexts—in terms of learner response, performance and outcomes. 	Designed-in usage capture, Sample Task Completion, Performance Observation, Participant interviews
<ul style="list-style-type: none"> Commitment to learning: Relative level of interest in items (topics, themes, skills, strategies, fun bits) 	Designed-in usage capture, Participant interviews or Participant feedback forms
<ul style="list-style-type: none"> Transfer and extension : kinds of use of knowledge, skills, and strategies from one course context to another and in a context that go beyond the classroom (to learners' lives) 	Designed-in usage capture, Sample Task Completion (multiple), Performance Observation
<ul style="list-style-type: none"> Learning outcomes: Perceptions of accomplishments and review of performance; how long did it take learners to acquire targeted skills; what experiences seemed to contribute most; were there unanticipated benefits or problems? 	Designed-in usage capture, Sample Task Completion, Performance analysis, Participant interviews, Participant feedback forms
<ul style="list-style-type: none"> Attitudes and behavior: Changes in dispositions vis-a-vis learners' own capacity to learn; use of technology to facilitate learning; involvement in life long learning activities 	Participant interviews or feedback forms

* Methods for collecting data are described in more detail in the narrative following this table.

Finding out how the materials work and whom the materials work best for requires intimate knowledge of the nature of materials use as well as the users attitudes and experiences. Methods to access these data include:

- Performance output analysis: Review of materials completed by participating learners to see to what extent learners have taken advantage of these opportunities, which opportunities were selected, and analysis of the contributions that learners made.
- Sample Task Completion: Learners of a specific type complete a sample task, which has been selected by the developer to help build a particular type of skills. If learners complete a series of sample tasks, transfer of skills and knowledge across tasks can be examined, products can be analyzed; data on use of specific opportunities included with the task can be examined. This should be accompanied by observation and feedback forms or user interview.
- Sample Task Observation: the learner's task completion process can be observed and they can be queried about it. Observation of this sort is of two types. One type is random observation which allows the evaluator to see how learners and instructors are using the materials and their reaction to them. The other type is planned, with the task observed specified to be sure it contains the elements of interest, and to be sure the observation can be contrasted with observation of other learners' audience segment experiences. Observation can be combined with an interview approach which asks the learner to Think Out Loud (narrate their own exploration process), which is helpful for interpreting the learner's motivation and response to different features of the product.
- Feedback forms¹¹: For this population can only be done with available coaching or in group administration environment. Potentially useful to gauge which materials were found to be most interesting, relevant and useful, to assess which tasks were completed and what was learned from them; to evaluate the use of knowledge, skills and strategies beyond the course; and to document changes in dispositions (attitudes, motivation)
- Participant interviews: This includes—individual interviews and focus groups, structured on-line conferencing or dialogue journals between learners and teachers and coaches, to see what worked for whom and why. This method is most useful for attitudinal, reaction, and individual experience queries.
- Designed-in monitoring mechanisms: These are of 2 types—(a) strategies to capture users' keystrokes through the navigational pathways and time spent in specific areas of the product or (b) exercises built into the product as part of the learning-to-learn or other modules

¹¹ Some of these may appear as Pre/Post assessments

While the first several strategies listed above are commonly used in formative evaluation, designing in monitoring methods is both more elaborate and more expensive than traditional formative evaluation approaches. We want to spend some space here, then, discussing the rationale for their use, so the possible benefits can be adequately considered. Incorporating formative evaluation tools as part of the product, from the outset, is premised on the importance of teaching learning-to-learn SCANS skills, and presupposes the ability to graft the fostering of learning-to-learn skills onto needs assessment and formative evaluation data collection. This is an ambitious agenda, and has to be thought out and incorporated into the instructional design process from the start, to succeed.

The rationale for grafting of learning-to-learn skills onto formative evaluation data collection. In Table 3, we already argued for an extensive learner characteristics data collection phase in order to identify to what extent learners have had experience with technology, to examine their dispositions toward technology use, and to find out about themes that resonate with learners and hot topics that get them excited. Some part of this data collection should entail eliciting information on the tasks that give learners trouble and the barriers they face in completing them.¹² Rather than just making this a one-time formative evaluation exercise, we argue that these data collection needs could be recast as on-going learning-to-learn modules within product activities. Reflecting on what it means to teach learning-to-learn skills leads us to argue the products themselves could consciously model the kinds of exercises we are encouraging the learners to engage in on their own.¹³

Data needs which can be satisfied through designed-in exercises. Much of the data needed for formative evaluation to answer the questions in Table 1 is very relevant to learners becoming aware of their literacy and language acquisition practices and learning-to-learn skills.¹⁴ Specifically, learners can be assisted by becoming conscious of how their reactions in the following areas affects their learning:

- the particular resources they draw on in using the product (e.g. others in the house who know English better or have higher levels of literacy, experience with technology), and

¹² This strategy was described earlier in this section as well as in footnote 4. We feel the products themselves should model the learning-to-learn skills we are emphasizing the learners should engage in. Thus, the importance of these built-in exercises.

¹³ Much of the data needed for the formative evaluation is appropriate to designed-in exercises. Not all of them, however, fit into this category. Discussions with developers about formative evaluation design will clarify which data may be useful for ongoing collection through design-in data capture mechanisms. Some elements of needs assessment may be less relevant to these focuses, and should be conducted outside the product, through the evaluation

¹⁴ Coaching needs to be available to those with minimal experience and those who experience high levels of frustration in trying to negotiate the materials

- how the product fits in with their learning agenda—exposure to topics of interests included in the materials, along with opportunities for engagement in the topic,
- their resonance to the product—reactions to and engagement with various components,
- the frequency with which they use the product at all or any component of it—extent users took advantage of the opportunities and resources provided within the Cyberstep materials,¹⁵
- what they tend to emphasize in the way they use product features, and what they gain from their use of the products (e.g. acquisition and use of knowledge, skills, and strategies in various contexts, along with changes in attitudes and behavior).

Obtaining information on what learners want, given their interests, and what they need, given their circumstances, can help ensure that materials are relevant, interesting and engaging. This can typically be done through self-report exercises designed into the materials. However, asking these questions and then doing nothing with the responses sets up false expectations for the learner.

When designing in exercises is important. Learning to learn involves the opportunity to think about their learning needs, interests, goals, process, learning opportunities, and how one uses resources in learning. It also involves learning how to make use of the information found out to shape one's learning to be more effective or efficient. Thus, to design-in learning-to-learn exercises as part of a formative evaluation, the product must have the following character:

- Learning pathways are somewhat fluid, so that learners are involved in shaping the content of what they learn, rather than following pre-specified learning paths.
- Learning experiences are somewhat interactive, so that learners explain the realities of their lives, including role that language and literacy play, and their responses influence learning content.
- The content of exercises is based to some extent on learner input, rather than being totally pre-specified.
- Learning goals are relate to what learners say they need, rather than on pre-set course objectives.

Examples data collection mechanisms which can also provoke learners to enhance their learning-to-learn skills. Learners can be engaged in evaluating the match and mismatch between his/her preferences and needs, on the one hand, and specific content, skills and/or learning process, on the other hand. In any instruction, learners have five natural concerns:

¹⁵ In the case of internet-based learning, a tracking and monitoring system can be built in that indicates what kind of learner spent what kind of time on which activity

- Where to start with the materials (Placement)
- What content focus is most productive (Sociogram exercises)
- How to use the product most efficiently (Identifying resources for learning)
- How to manage my learning most efficiently (Charting a course)
- How to figure out how I'm doing (Where next)

Table 6 provides examples of how these concerns can be translated into exercises which both serve to support learning to learn skills as well as serve as the formative evaluation, and, longer-term as a focus for product enhancement. The suggestions constitute a built-in needs assessment for the learners' own use as well as the instructor's or facilitator's use and the developer's use in assessing how to improve the performance of the product.

The left-most column provides a general title of an exercise that could be built into the materials, and with which the reader may be familiar.

The middle column provides a general description from a user's perspective of what the exercise would contribute.

The right-hand column provides a general description from an evaluator's perspective of the purpose of the exercise and the kind of statements which could be made with resulting data.

Table 6
Strategies to Learn about the User from Exercises Designed into the Technology

Needs Assessment Exercises	Learner orientation to exercise	Purpose of exercises and Statement to make from evaluation
<ul style="list-style-type: none"> Placement 	Where should I start? How can I make the most of current language knowledge and practices? Variables: Levels of performance competencies	<i>Purpose:</i> Mapping current language proficiency levels. <i>Evaluation statements:</i> Learners with a specific level of proficiency in specific areas tended to have specific experiences <i>Underlying issue:</i> How to better facilitate learning with these materials among learners with specific proficiency
<ul style="list-style-type: none"> Sociogram exercises 	What English do I Need? How can I get the most out of these materials Variables: Types of language usage, Current language areas of proficiency and need	<i>Purpose:</i> Mapping learner profiles as language users <i>Evaluation statement:</i> Materials may be more effective with learners who use language for certain functions <i>Underlying issue:</i> How to capitalize better on specific learner orientations to usage?
<ul style="list-style-type: none"> Identifying resources for learning 	What are learning resources? Variables: Level and type of technology use, previous successful learning formats, and types of perceived literacy competencies	<i>Purpose:</i> Mapping learner profiles as learner experiences <i>Evaluation statements:</i> Materials may be more effective with learners who have technology experience at a particular level, or who have experience relying on graphic materials, etc. <i>Underlying issue:</i> How to capitalize better on specific learner experiences?
<ul style="list-style-type: none"> Charting a learning course 	What I want to do with my English? How I want to learn English? Variables: learner attitudes and orientations	<i>Purpose:</i> Mapping learner profiles as interest and learning style. <i>Evaluation statement:</i> Materials tend to be more effective with learners who are visual and interested in occupational skills <i>Underlying issue:</i> How to build in support for learners with different styles?
<ul style="list-style-type: none"> Where Next 	What have I learned? What more do I need to know to meet my goals? Variables: Learner performance, Learner benchmarks for achievement, achieved competencies, Learning pathways	<i>Purpose:</i> Mapping learner achievement in relation to interest and learning style <i>Evaluation statement:</i> Learners valued the product because it fostered their ability to do x or y <i>Underlying issue:</i> How to accelerate performance for learners at different levels for learners with different styles, with different kinds of support.

On the next page we discuss in more detail each of these concerns.

Row 1: A primary issue for every learner is where in the materials or course they belong. For the instructor and developer this translates into the question which learners do better, what support learners need to use the materials, and how to strengthen the positive impact of the materials experience for learners. It's typical to give the TABE or CASAS or some other test for placement; however for the purposes of the formative evaluation we suggest a product-based assessment of performance keyed to the skills targeted for development. A relatively simple exercise could be developed to identify basal level skills for specific test units, with some thought to SCANS, CASAS, and EFF, which would be low on threat to the learner and high on payoff for the developer. These would not be useful for a normative analysis of performance, but the developer would be able to say learners who performed x, could do And could not do previously at a Level. Instructors will be key to the effectiveness of this component.

Row 2: What learners bring to the instructional moment in terms of literacy and learning habits also define who the user is. Learners who are more comfortable with technology, who use more English in their everyday life, who are employed in jobs which structure interaction with language and communication materials in certain ways are likely to interact differently with the materials than others. Learner Examples of Socio-grams that map language use help define when and where learners need to use English (contexts and situations), who they talk with and about what, along with whom they are afraid to talk to and why. Similarly, inventories of literacy practices identify the kinds of reading and writing learners (or potential learners) engage in their daily lives, along with what helps them and what gets in the way. Such needs assessments can also identify "language and literacy brokers," the folks who help others to fill out forms and applications, who translate and interpret for them, and who otherwise assist them in negotiating print and navigating systems that are unfamiliar.

Row 3: It is worthwhile to find out what gets learners excited, what makes them smile, laugh or cry and what brings them satisfaction. Much of what literacy programs have to offer is challenging to the extent that it causes frustration. There is much to be said for a balance between task that require some cognitive effort and activities that are joyful and relaxing. Motivational pieces, particularly authentic learner stories might serve to hold people's attention as well. Since it is difficult to articulate what one would find fun and exciting (especially in a new medium), it is might be better to present learners with a series of segments that evoke thoughts and emotions and asking them to select those they find most interesting. This is a way of identifying resources for learning.

Row 4: Attitudes, orientations, and goals or objectives are factors that need to be taken into account in assessing learners' response and use of the materials—they define, in part, who the user is. Potential learners need a chance to discuss what motivates them and what makes them reluctant to learn. They need to discuss the barriers they face in trying to

communicate face to face or in trying to upgrade their literacy skills. Situations that cause shame or embarrassment need to be explored so that materials can be developed that acknowledge these feelings while providing the opportunity to develop both confidence and competence in circumstances that are particularly “sticky.” Charting a Course or Planning for Success exercises can provide this information. An examination of learner goals (short terms and long term) can provide fruitful information as well, although the question “What do you want to learn?” does not generally lead to great insights. Answers tend to either be too broad (“I want to learn English”) or too discrete (“I want to learn spelling.”) to be helpful to developers. Asking learners to discuss topics or situations and rating them according to their level of importance or inviting them to tick off a list of tasks that provide difficulties tend to yield more useful results. Finding out about learners’ specific goals (to get a driver’s license, to learn the skills needed for a particular job, to succeed in vocational or academic classes, to help their children with their homework) can form a strong basis for the development of specific content.

Row 5: A final question for every learner often is: what have I gotten out of the course or materials. What do I do next? By the time the facilitator or developer hears it, however, the learner has left and the learning process therefore doesn’t benefit from the answer. Providing learners with the chance to review their performance, and talk with a coach about why they got x right or wrong, how close they are to writing the letter they want, to getting the drivers’ license, to being able to help their child with homework, can provide vital assistance both the learner and the instructor, as well as the developer/evaluator for how to enhance the product or what to develop next.

The above discussion of users referred primarily to learners. Cyberstep materials will be grounded in the context in which learners function and the domains that affect their ability to participate successfully in a course (see DOMAIN MATRIX in Task 2). Thus, instructors and facilitators perspectives are crucial to include in the formative evaluation.

2. Issues regarding Product Function—How does the product operate in practice, what multi-media features seem to work better and less well to foster learning, what difficulties do learners have with the materials?

The questions of how the product functions and how learners (and instructors) use it are entwined, but distinct. While the issues related to product use related to what learners made of their experience with the materials, product function refers more to the utility of the design specifications. That is, questions of product function inquire whether the recommended specifications were followed, whether the design elements work as expected, whether users can follow the product structure and navigational techniques, how the range of product features augment the

experience, where users may get stuck with the product, what learners focus on in using it, and what they are learning?

In Cyberstep Tasks 1 and 2¹⁶ a framework and set of learning principles, strategies and guidance for content for Cyberstep materials were articulated along with the underlying rationale for them. This framework suggested the appropriate content focus, the opportunities which should be provided to learners, characteristics of the interface design elements which should support those opportunities, and how adults should use these opportunities to foster learning. As part of the formative evaluation, it is appropriate to explore, describe and assess.

- to what extent the design principles are incorporated as part of the materials,
- how adults responded to the materials and these elements in the materials,
- what was expected of the adults (learners and instructors) in order to fully benefit from using the materials, and
- how these elements function in the real world environment to promote learning.

Additional questions might focus on what was especially enjoyable and what was frustrating? What was difficult what was a piece of cake. As is true in all sections, questions also need to try to determine to what extent learners were able to move toward their goals (and what difference it made to them if they didn't), what difference the technology made in their learning, and what the learning outcomes were. **Table 7** summarizes issues to address in terms of product function in the formative evaluation. Both concerns—product function and use—will likely differ for specific profiles of learners, in diverse learning venues. Thus throughout the assessment process, two groups of learners need to be involved: those working as part of a classroom-based program and those working independently.

¹⁶ Cyberstep Project Task 1 paper: Standards for Creating Multimedia Learning Modules for Low Literacy and Limited English Proficient Adult Learners, February, 1999. Cyberstep Project Task 2 paper: Resources: Materials Development Framework for Courses Targeting Low Literacy and Limited English-Speaking Students, July, 1999.

Table 7
Analysis of Product Function Issues

Design Issue	Evidence about design adequacy— Materials incorporate support for:	Data Capture Strategies
<p>1) Do materials take advantage of multi-media possibilities to extend and deepen learning?</p> <p>Do materials build exploration behavior, learning curiosity, risk-taking and learning-esteem?</p>	<ul style="list-style-type: none"> • Visual, auditory, graphic information (photographs; drawings; animation) appropriate to learning task to illustrate points and reinforce skills and strategies • Technology which functions well in different learning environments • User-oriented design features: simplicity, clarity, intuitiveness of navigational devices, readability, consistency (both within one medium (e.g. on-line) and across media (e.g. video to print)) • Content-oriented design features: Clustering of like elements, color coding and other methods for clustering and prioritizing user attention, comprehensibility (including some bilingual support for ESL learners), differentiated learning opportunities for those more proficient or more advanced in learning through technology and those less proficient or less skilled in technology literacy • Authentic contexts to illustrate situations that have relevance to learners' lives and include interaction opportunities that incorporate resources in and beyond the immediate learning environment • Learner involvement opportunities: structured, as in assessments, and non-structured, as in tips for how to extend learning and opportunities for recording findings or interact with 	<ul style="list-style-type: none"> • Expert feedback on lay-out and navigation tools <ul style="list-style-type: none"> • Review by Instructors • Review by Peers • Review by other designers • Demonstration: Exercises designed for learners <ul style="list-style-type: none"> • Learning reflections built in and used • Tools and tips are built into exercises and used • Learners can transform situations to more closely reflect their lives and interests • Learners customize their learning

Design Issue	Evidence about design adequacy— Materials incorporate support for:	Data Capture Strategies
<p>2) What knowledge and skills to make use of products are required? How do the materials incorporate support for use of the resources they include?</p>	<ul style="list-style-type: none"> • Experience with technology: including the ability to operate and troubleshoot hardware, use navigation tools (e.g. mouse), re-access desired segments (e.g. rewind, use the counter to find specific segments, tape broadcast segments for later viewing), print and save with computer • Experience with applications and web use: ability to use interfaces and browsers and operating systems to launch applications, basic navigation through applications, search engines, word processing, databases • Experience with learning using technology: Use video segments to learn, coordinate video and print segments, doing collaborative projects through e-mail, exchange of video, joint writing, inquiry maps, etc. • Experience with ancillary learning tools like e-mail: getting free accounts, compose using cutting and pasting techniques, send and receive, scanning technology • Level of language proficiency • Resources to build knowledge such as reference library, navigation guides, index 	<ul style="list-style-type: none"> • Expert feedback on lay-out and navigation tools <ul style="list-style-type: none"> • Review by Instructors • Review by novice and experienced learners • Review by Peers • Review by other designers • Observation of learners and instructors usage on tasks or simulation thereof, that allow learners to demonstrate competence and comfort¹⁷ • Interviews and focus groups with learners • Self-assessments, using checklists or scales • Quiz questions, • Performance (e.g. within tasks involving use of chat rooms, discussion forums)

¹⁷ For learners with no or little experience, group tasks that allow learners to demonstrate what they can do on their own or with help from others might work well. They can be followed by self-assessments that gauge learners find easy, hard, or frustrating.

Design Issue	Evidence about design adequacy— Materials incorporate support for:	Data Capture Strategies
3) Do learners and instructors make use of the multi-media aspects?	<ul style="list-style-type: none"> • Learners' own Interests and goals • An overview of what kind of information can be found where and how to get there (and back), recognized by learners • Learner control: over the sequence of learning (random access to themes from which task, skills, and strategies emerge); learners can navigate among resources involved and find their way toward skills development • Learners' ability to track and review work: Create and save their own materials (e.g. personal dictionaries, stories, drawings, greeting cards); monitoring and recordkeeping • Instructors' ability to control learning and review work: instructors can program learning sequence or focus and review learners' progress • On-line help and guidance for learners and instructors • A range of activities: some focused on simple problem solving others more complex scenarios and simulations; representing a range of themes, scenarios, tasks, skills and strategies from a menu of choices • Sequenced learning: Move from familiar contexts and tasks to more generalized areas; from simpler to more complex 	<ul style="list-style-type: none"> • Expert review of product and product-related MIS (e.g. tracking and portfolio of saved materials) • Observation of learners (possibly video-taped), interacting with materials (plus think aloud protocols) • Debriefing with learners to find out what learners expected to find and what was actually there

Design Issue	Evidence about design adequacy— Materials incorporate support for:	Data Capture Strategies
4) The effect of combining various learning modalities to promote language acquisition and literacy development	<ul style="list-style-type: none"> • Ability to select from activities that are fun and relaxing (games that reinforce skills) and from task that require more intensive cognitive involvement (writing something for publication, such as an on-line newsletter) • Ability to select from a variety of tasks, some focused on problem solving and meaning-making, others on more form-focused skills, such as grammar, spelling or pronunciation 	<ul style="list-style-type: none"> • Observation of learners and instructors usage on tasks or simulation thereof, that allow learners to demonstrate competence and comfort¹⁸ • Interviews and focus groups with learners • Self-assessments, using checklists or scales • Quiz questions • Performance (e.g. within tasks involving use of chat rooms, discussion forums)

It is understood that not all elements of all materials can be fully tested in all contexts, with all types of users. Rather, it is expected that, following the guidelines discussed with Issue 1, key elements of the materials will be systematically tested.

3. Issues regarding Product Outcomes—Is there a Significant, Positive impact on Learner Performance?

Instructors will be key informants for the formative evaluation in terms of four specific concerns—namely their reflections on:

- The utility of the materials for accomplishing the specific instructional objectives.
- The fit of the materials with what the instructor is currently using.
- The kinds of challenges these materials pose for the instructors, and how to meet them.
- Ease of facilitating learning through the MIS that is provided with/built into these materials.
- Learners' response to the materials, and what would enhance impact.
- Achievement through the materials relative to the national benchmarks for performance.

Cyberstep materials will be organized around themes. Content knowledge, as well as skills and strategies will be embedded in these themes. The various media (video, print, CD-ROM, and web-based materials) will support each other and extend learning, each taking advantage of the possibilities unique to the medium. The themes will embed scenarios, case studies, learning tasks, and activities designed to develop and strengthen the following elements of language and literacy.

¹⁸ For learners with no or little experience, group tasks that allow learners to demonstrate what they can do on their own or with help from others might work well. They can be followed by self-assessments that gauge learners find easy, hard, or frustrating.

Table 8 summarizes issues on which instructors should provide input based on their expert knowledge, and methods that might be incorporated into the formative evaluation to facilitate this.

Table 8
Product Outcome Issues for Instructors' Feedback

Issue	Methods
<ul style="list-style-type: none"> Fit with existing curricular and extra-curricular materials 	Desk review and performance product analysis
<ul style="list-style-type: none"> Basic Language and Literacy Skills needed for oral and written communication (e.g. subskills such grammar, pronunciation, spelling), strategies for self-expression, information processing and learning how to learn. 	Desk review and Performance product analysis.
<ul style="list-style-type: none"> Resources (on-line; software; print), tied to familiar themes, such as parenting, skills, such as spelling; goals such as the GED or getting a Driver's License, or tasks and simulations (multi-media encyclopedias) 	Desk review, Performance product analysis, and learner interview.
<ul style="list-style-type: none"> Subject matter introduced through situational contexts that call for topics or themes that have relevance to learners' lives, Hot Topics or "Fun Pieces" (or "Bits and bytes") that speak to learners' interests or represent "sticky situations" 	Desk review, Performance product analysis, and learner interview.
<ul style="list-style-type: none"> Specific national framework benchmarks--Life Skills Competencies (CASAS), SCANS, EFF 	Desk review and Performance product analysis.
<ul style="list-style-type: none"> Materials functioning—Ease of operation of the materials in this environment, and problems that learners and instructors face 	Observational log and feedback form.

Primary methods reflected in the table relate best to formal instructors or aides in a classroom environment. These methods are:

- Desk review. Instructor reviews content related to selected topic areas or sample lessons. Indicates themes, lessons, operations that will be difficult for learners and why; importance of content covered; and expected outcomes. Most useful if the review is of the same lesson which learners also are testing. In some cases, achievement requirements for selected components will be responded to by instructors using existing curricula and frameworks specified by a state or district. Instructors will so note that. A form can be designed into specific lessons by developers
- Performance product analysis. Instructor reviews targeted content focus of lesson and provides feedback concerning learners' skills development and knowledge acquisition relevant to that focus. Most useful if for lessons students are testing
- Learner observation and interview. Observes process of using materials by learners and informally interviews learners concerning what they observed and learners' attitudes toward the materials.
- Observational log: Instructor or Learner support person records problems or issues regarding use that arise during 8 days with

materials—first 4 days and 4 days a week or 2 later—using a form provided by the developer. Form requests date, # of learners using materials, issues which arose, general reflection on benefits and disadvantages of materials as seen today.

- Feedback form/Learner support interview: Instructor summarizes response—attitudes, desk review, product analysis, learner interviews, and observations—relevant to entire experience with the materials, specifying context of the use or factors which he or she thinks affected the feedback. At least one overall rating scale is used, although much may be narrative.

While the majority of the methods seem most appropriate for formal instructors or aides, literacy brokers in the home environment or less formal classroom environments can be engaged through oral feedback sessions with learners themselves, working jointly. The importance of involving less formal literacy agents in the process to see how the materials can strengthen learning resources outside the classroom context and what features could strengthen the ability to transport skills learned outside the materials framework.

4. Issues regarding Needed Support—Are Materials Useful in Different Learning Settings?

Context issues for developers relate to both learners and instructors/facilitators. The wide variety of contexts in which the products were targeted are described in the report on Cyberstep Task 1¹⁹. While the wide variety of contexts from a product-use perspective is great, from an evaluation perspective, given the costliness of formative research, the wide intended use poses the question of where the product *really* has to be tested in order to see how it works. To address this question we've looked at commonalities among the nine different learning venues identified in the report on Cyberstep Task 1, and have found they coalesce around four dimensions:

- degree of structure of the learning environment,
- extent of learner support,
- extent of support for technology, and
- Extent of competing demands on learner attention at the time of intended use.

Extent of structure of the learning environment relates to whether other materials and strategies are in use which the product has to support, extend, or supplant. Extent of learner support in the venue relates to whether a facilitator or instructor is available in the context who can support the user both in the technical aspects of using the product and with the learning content and exercises provided with the product.

¹⁹ Cyberstep Project Task 1 paper: Standards for Creating Multimedia Learning Modules for Low Literacy and Limited English Proficient Adult Learners, February, 1999, pages 12 and 22.

Extent of support for technology refers to the ability to accommodate the product by having access to the kinds of equipment which would effectively demonstrate product features. Extent of competing demands for learner attention at the time of intended use relates to the extent the product has to accommodate short spurts of use and non-traditional user involvement and support into its design, or whether the materials will be the main focus of users' attention over a period of time. **Table 9** depicts each of the contexts in which the materials might be used in terms of these variables.

Table 9
Analysis of Different Learning Contexts

Context	Dimensions Distinguishing Contexts			
	Extent of Learning Structure in the venue	Extent of Learner Support in the venue	Extent of Support for Technology	Extent of competing demands for attention during product use
• Classroom	High	High	High	Low
• Classroom supplement	Medium	Medium	Medium	Low
• Volunteer program	Medium	High	Medium	Medium
• Community center	Medium	Medium	Medium	Medium
• Learning center lab	Medium	High	High	Low
• Literacy drop-in center	Medium	High	Medium	Low
• Home	Low	Low	Low	High
• Cable TV or ITFS delivery	Medium	Low	Low	High
• Web-based instruction	Low	Low	Low	High
• Worksite				
• class-based program	High	Medium	Medium	Low
• volunteer tutor-based program	Medium	Medium	Low	High

Learning contexts which are highly structured with high amounts of support for the learners in terms of how to get the most out of the materials and how to use the materials effectively, and which can dedicate time to the use of the materials—such as classrooms or even learning labs or literacy drop-in centers—will provide a distinctively different experience for the learner from those learning settings where learning is much less structured and there is no handy support for how to use the resources in the materials effectively or overcome barriers in use—such as learning in the home or the more informal learning programs. The differences highlighted in Table 9 are proxies for the skills and support necessary to use the materials effectively. Where there is less support, the users themselves—teachers and learners—have to be equipped with sufficient skills and knowledge to use the materials on their own. What it takes to do this will depend on the differences among users' specific needs and problems with using the materials. However,

we expect that the very learners we are targeting may have specific constraints that should be taken into account in materials' design. Thus, it is very important to examine how users, with different patterns of low literacy level and with different levels of exposure to U.S. culture, relate to and use the product in settings with more support (at the high end with each of the variables listed in table 9) and with lower support (at the lower end with each of the variables listed in table 9). The specific utilities, knowledge or skills-building which should be incorporated into the design to support product use should be informed by observing users' (learners and instructors) reactions to the product, ease of product use, and ability to use the product to extend learning to overcome the barriers learners face in applying skills learned to change their behavior or promote their own learning.

The testing of Cyberstep products for use in different learning settings, then, we believe can be streamlined if the testing takes into account the 4 dimensions on which they vary summarized in Table 9. Much like in the formative evaluation of Crossroads Café, the testing should be in (or consider strongly) at least 3 different contexts: a classroom venue, a volunteer or community center venue which is less formal and has fewer resources for technology and literacy development support, and a home-based context.²⁰ For each of the user issues tested, an audience segment, involving about 10 users, is required.

Central questions for developers relevant to use of the product in different learning contexts will be:

- whether different kinds of learners react differently;
- how learners get access to and use the materials;
- how do they use the materials in different contexts;
- how much and what kinds of help they need in different venues;
- how learning facilitators get access to and interact with learners in use of the materials;
- what is perceived to be particularly valuable about the product in different settings.

This means the product should be designed to capture data on these issues no matter where it is tested. **Table 10** provides suggestions on the minimum data to be captured and specific strategies for doing so. A consistent principle in the data capture strategies suggested is to design into the product exercises and MIS which have the dual function of fostering learning and providing information about it. Both of these functions are central to directing learning, and, when put into the hands of learners, consistent with SCANS' learning-to-learn skills.

²⁰ Crossroads Café, designed to be a self-contained home study course, actually was tested in three different delivery modes: home study, in class and a hybrid model combining home and classroom study. The hybrid model had learners in a classroom work in the materials at home, with the teacher providing a weekly help/debriefing session that learners were required to attend. The information from Crossroads Café was not taught during the regular class session. J. Johnston, E. Brzezinski, and R. Stites, National Center on Adult Literacy, April 1996, page 5

Table 10
Types of Observations Regarding Learning Context

Focus	Data	Data Collection Strategies
Learner reactions	<ul style="list-style-type: none"> • Attitudes and Comments 	<ul style="list-style-type: none"> • Opinion component to each exercise • Survey as part of delivery strategy
Learner characteristics	<ul style="list-style-type: none"> • Literacy level, • Gender, • Technology comfort level, • Exposure to U.S. culture, etc. 	<ul style="list-style-type: none"> • Exercise element in product: • Literacy practice and level pre-test and • Tell us about yourself
Patterns of Learner use	<ul style="list-style-type: none"> • Frequency of use • Support people involved • Types of interactions 	<ul style="list-style-type: none"> • Capture time spent on product • Capture who is in room at time of use at log in—invitation to be involved • Interview and observation of user
Need for support	<ul style="list-style-type: none"> • Errors • Requests • Frustration • Peer and Instructor interaction 	<ul style="list-style-type: none"> • Capture errors made and requests • Log of use • Interview and observation of user
Instructors' reactions	<ul style="list-style-type: none"> • Attitudes and Comments 	<ul style="list-style-type: none"> • Opinion component to each page • Survey as part of delivery strategy • Instructor interview and observation
Instructors' characteristics	<ul style="list-style-type: none"> • Gender, • Teaching role and experience • Technology comfort level • Subject taught • Orientation to individualized instruction 	<ul style="list-style-type: none"> • Survey as part of delivery strategy
Relation of product to other materials	<ul style="list-style-type: none"> • Rating based on product unit 	<ul style="list-style-type: none"> • Survey on-line analysis • Interview with Instructor-user
Suitability for the environment	<ul style="list-style-type: none"> • Instructors' reactions • Learners' reactions 	<ul style="list-style-type: none"> • Include element in product—What would help me use this better. • Observe and analyze from extent of use

In Table 10 we are suggesting that developers consider incorporating this learning analysis into Cyberstep learning products. If developers take care to make data collection as germane to product use as possible, the burden on the developer of designing formative evaluation data capture strategies into the product could be fully compensated by the learning-to-learn skills promoted by these exercises. Whatever the strategy, the burden for formative evaluator is to ensure the user is aware of what data are being captured and why; and their permission is granted for use of the data.

5. Issues Regarding Product Framework—Do the Products Suggest a Development Framework?

Cyberstep is an ambitious and exciting project, with the projected results being a set of products, which make use of multi-media development options to foster literacy and language acquisition among low literacy adults and/or adults limited in English skills. The products from Cyberstep Tasks 1 and 2 have been to create common understandings and expectations for the products across developers.²¹ Certainly one of the issues related to any set of materials learners use is how they relate to other materials available, and what competencies or skills learners can acquire from within the materials provided. Issues for the product developers, as well as the team as a whole, from this approach, then, are:

- To what extent do the materials incorporate the standards articulated in Tasks 1 and 2?
- Do the standards work to give the products a similar look and feel?
- To what extent and how do the materials relate to each other to leverage learning?
- To what extent do the standards create a framework for future development?

The formative evaluation on these issues relates more to expert opinion, documentation of learning focus and strategy, developer observations of others' products, developer, evaluator, and expert reflection of possible strategic relationships among products, and learner reactions concerning what they need from the products and other resources which would be useful. These are questions that are relevant in all the product development phases.

²¹ Cyberstep Project Task 1 paper: Standards for Creating Multimedia Learning Modules for Low Literacy and Limited English Proficient Adult Learners, February, 1999. Cyberstep Project Task 2 paper: Resources: Materials Development Framework for Courses Targeting Low Literacy and Limited English-Speaking Students, July, 1999.

PROPOSAL FOR HOW FORMATIVE RESEARCH CAN ASSIST THE DEVELOPERS

This is formative evaluation, not summative, so the results desired are indicators of changes it would be important to make to enhance product appeal, functioning, effectiveness, and value of the product in different contexts for different kinds of learners toward different learning goals and objectives.

Specific evaluation plan for a product should be developed, recommending specific evaluation strategies (methods, respondents, protocols) for specific product concerns at different points in time. The specific questions relevant to this project are proposed in Table I. Specific points in time important to provide user input include those summarized in **Table 11**:

Table 11
Summary of Evaluation Input for Different Product Phases

Product phase	Focus of input	Respondents
<ul style="list-style-type: none"> • Concept 	Why is the product needed? What will it help learners do? How does the project fit into existing products? What are projected learning outcomes?	Funders, Peers,
<ul style="list-style-type: none"> • Proof of concept (i.e. rapid prototype demonstration), 	Is the approach sound, can the product be implemented, What are product standards/ what would successful implementation look like, Who would best benefit from the product	Funders, Peers, Product, Media and Subject Matter Specialists, Instructors, Learners
<ul style="list-style-type: none"> • Initial development phase complete (alpha test), 	Does it implement the Task 2 standards, Are the product standards sufficient to accomplish project goals, Does the product function as intended, Is the learners' response to the product as intended? Who functions best with the product, what can be strengthened about it? What sort of outcomes might be achieved with it? What sort of support is necessary to use it and sustain outcomes?	Product, Media and Subject matter specialists, instructors, learners, program administrators, Resource professionals
<ul style="list-style-type: none"> • Pre-release (beta test) 	What outcomes are achieved with it? What are use characteristics and problems? What sort of support is necessary for use? What bugs need to be fixed in the product?	Instructors, Learners, program administrators, resource professionals
<ul style="list-style-type: none"> • On-going, for use at times strategic for product enhancement and versioning 	How are users needs changing? What sorts of augmentation are necessary to the product to increase relevance and enhance or sustain learning? What sorts of augmentation are necessary to enhance power of instructor facilitation with the product? What bugs need to be fixed	Instructors, learners, resource professionals

Key to a successful, cost-effective strategy is creating a specific plan for each product which takes into account the development phase, the

specific feedback issues under consideration, and how best to provide cost-efficient data. With Cyberstep there is also the possibility of combining feedback strategies across products. Whatever the strategy, it needs to be worked out with each partner.

We propose to systematically review the evaluation needs with each partner following the checklist described in **Table 12**. The result should be a viable and useful evaluation plan for at least one element of the developer's work, as well as a model for use with other aspects for the product.

Table 12:
Formative Evaluation Development Checklist

Plan Elements
• Product & Phase
• Product Issue
• Evaluation Objectives/Data input needed
• Audience Segment Strategy
• Methods,
• Instruments
• Data analysis strategy
• Implications from results

Intent of the plan, the plan itself, and project timelines will be reported in this section when complete. **Appendix E** includes the report from the initial discussion with each of the developer groups.

Technical Appendices

- Appendix A Formative Evaluation Questions and Themes
- Appendix B1 Specific Research Issues related to Learner Characteristics
- Appendix B2 Aspects of Standards Frameworks Likely to be Influenced by Adult Learner User Group Characteristics.
- Appendix C Appropriateness of Method to User Group and Issue
- Appendix D Formative Evaluation Structure Worksheet
- Appendix E Report of Initial Discussions re: Aguirre role in Formative Evaluation

Appendix A: Formative Evaluation Questions and Themes

Project Objective and Formative evaluation questions of concern	The User	Context	Product Function	Product Focus	Product Use	Product Support
1. Successfully educate adults functioning at low literacy and limited English levels.	<ul style="list-style-type: none"> ▶ Appropriate for ESL and Low Literacy Students? ▶ What student characteristics most important? 	<ul style="list-style-type: none"> ▶ variety of product contexts, where population served 	<ul style="list-style-type: none"> ▶ Features most successful 	<ul style="list-style-type: none"> ▶ Features most successful 	<ul style="list-style-type: none"> ▶ Who it works well with ▶ What's needed ▶ Level of use in different contexts 	<ul style="list-style-type: none"> ▶ What help do learners need to use it, in different contexts?
2. Have significant, positive impact on learners' knowledge skills and attitudes in significant literacy and language areas, consistent with other national and state frameworks and standards.	<ul style="list-style-type: none"> ▶ What product focuses most meaningful to students with different learning profiles? ▶ Which students achieve what, relevant to other frameworks? 	<ul style="list-style-type: none"> ▶ Which venues does it work best in? ▶ Does product use affect learning specific standards? 	<ul style="list-style-type: none"> ▶ Navigational pathways emphasize specific focuses? ▶ Navigation pathways emphasize standards achievement? 	<ul style="list-style-type: none"> ▶ What do users find most important for them? ▶ What focuses contribute to greater gains in learning specific standards? 	<ul style="list-style-type: none"> ▶ How can we build impact on achievement? ▶ How can we build achievement in specific areas? 	<ul style="list-style-type: none"> ▶ What support do learners function effectively with these materials? ▶ What support assists in building specific standards?
3. Be appropriate for use in a variety of venues (home, school, workplace, informal location).	<ul style="list-style-type: none"> ▶ How do learners use materials differently; why? And what can be done to enhance? 	<ul style="list-style-type: none"> ▶ What different support, features, and focus useful in different venues? 	<ul style="list-style-type: none"> ▶ Is there a specific feature which facilitates use in a venue 	<ul style="list-style-type: none"> ▶ Is there a specific focus which is more attractive in a venue 	<ul style="list-style-type: none"> ▶ What works better or needs to be strengthened? 	<ul style="list-style-type: none"> ▶ What support is needed for different learning venues?
4. Be used by learners in productive, enjoyable, and satisfying ways.	<ul style="list-style-type: none"> ▶ What do learners with different profiles like and function effectively with? 	<ul style="list-style-type: none"> ▶ How do learners work with these materials in different venues? 	<ul style="list-style-type: none"> ▶ What features are most satisfying, productive and enjoyable to learners? 	<ul style="list-style-type: none"> ▶ Which focuses are most satisfying, productive and enjoyable to learners? 	<ul style="list-style-type: none"> ▶ How can the features and focuses less used be augmented 	<ul style="list-style-type: none"> ▶ What supports would help learners use these more effectively?

Appendix A, continued

Project Objective and Formative evaluation questions	The User	Context	Product Function	Product Focus	Product Use	Product Support
5. Develop materials which instructors or facilitators can use successfully with learners, which complement other materials in use, and which effectively foster needed skills among learners.	▶ How do facilitators/teachers work effectively with different user profiles with these materials?	▶ In which contexts do facilitators work better with these materials?	▶ Which functions are facilitators/teachers using, and how, to productively impact learning for different users?	▶ Which focuses are facilitators/teachers most comfortable with (and most emphasizing) , in which settings, with which learners?	▶ What's worked, with whom, in what contexts?	▶ How can we strengthen performance in specific areas?
6. Develop materials which can be seen to be successful with learners and which are deemed desirable by them.	▶ What are the diverse profile of users' comments about these materials.	▶ What do users say about how they've used them successfully in different contexts	▶ What do users say about what they most appreciate and how they've used innovatively different product functions?	▶ What do users say, and what does their work demonstrate about what they've gained from using these materials?	▶ What are the reports on product strengths and who it works well for?	▶ What are the reports on what specific user support can accomplish with these materials?

Appendix B1: Specific Research Issues related to Learner Characteristics

Learner Characteristics	ESL Learners	ABE Learners
Age	<p>Is content appropriate to challenges or skills demands for each sub-population?</p> <p>Does material present each sub-population with characters who can be seen as “people like us”?</p>	<p>Issues are same as ESL learners</p>
Educational Attainment	<p>Is material accessible for learners with different levels of educational attainment—in particular for elementary school dropouts?</p> <p>What, if any, are the special difficulties faced by very low literate ESL learners in using materials?</p> <p>Are there special learning pathways to provide support for very low-literate learners?</p> <p>What factors enter into very low literate learners’ assessment of whether the materials are appropriate for “people like us”?</p> <p>If materials are not deemed satisfactory, what cues or utilities might overcome the problem?</p> <p>If cues or utilities are not judged likely to do the job, what arrangements should be made to support learners who use the materials?</p>	<p>Is material appealing to learners with relatively high levels of educational attainment who, however, still need remediation or skills development help?</p> <p>Are learner tips or coping strategies, if any, presented to help very low literate learners judged to be feasible and useful?</p>

Appendix B1, continued

Learner Characteristics	ESL Learners	ABE Learners
Labor Force Status	<p>Does material include information on confronting the particular functional demands faced by workers in immigration-dominated sectors (communicating with English-speaking bosses)? Is this information or are skills development techniques useful for improving communication?</p> <p>Does material include information on confronting the particular sociolinguistic challenges of immigrants not in the labor force (e.g. mothers wishing to participate in their children’s education)? Is this information or skills development techniques useful?</p> <p>Does the material include skills instruction useful for moving out of immigrant sector occupations into the English-language workplace?</p> <p>Additional issues as identified for ABE learners</p>	<p>Does the material include attention to document literacy demands in the workplace (e.g. reading job announcements, reference skills for using policy or procedure manuals)?</p> <p>Does the material include attention to getting labor market information (e.g. O*Net) or thinking about interests, skills, job requirements?</p> <p>Are there “learning to learn” strategies presented to help displaced workers? Are they useful?</p> <p>Do the Cyberstep materials seem to promote the idea of collaborative learning in the workplace, at home, or in day-to-day life?</p>
Time in US Exposure to English	<p>Do learners consider the materials to present distinct “tracks” for learners with different English-language skills development needs? If so, are the distinct tracks judged to be good by each sub-group?</p> <p>Does the material build on the English-language competencies of learners who have been exposed to English for many years?</p> <p>Is the material likely to leverage high levels of English-language practice? Do the materials promote linguistic risk-taking and exploration?</p> <p>Do the materials promote the idea of language as a tool of self-expression (as opposed to a right way and “wrong” way of talking)?</p>	<p>Is there information on standard English vs. dialects of English? Is material acceptable to non-standard English speakers? Is it useful?</p> <p>Is there attention to style/genre for special kinds of writing (e.g. formal letters, job inquiries)? Is it useful?</p> <p>Do the materials promote linguistic risk-taking and exploration? Do the materials promote the idea of language as a tool of self-expression (in addition to a right way and “wrong” way of talking or writing)?</p>

Appendix B1, continued

Learner Characteristics	ESL Learners	ABE Learners
Self-Assessed Functional Competency	<p>Do learners who assess themselves as being at different levels consider the material equally useful or does it seem too difficult or too easy?</p> <p>Does the material present ways for both illiterate and limited-literate learners to engage in sustained, ongoing reading and writing?</p> <p>Does the material have ways for learners to check whether their assessment of their skills seems right or wrong? If so, is the new information considered to be useful?</p>	<p>In addition to ESL issues:</p> <p>Does the material present ways for both illiterate and limited-literate learners to engage in sustained, ongoing reading and writing?</p>
Prior Adult Education Experience	<p>Do learners consider the materials to be responsive to their individual needs or do they miss a teacher to ask for help?</p> <p>Do learners believe that people like them would keep on using materials to build their skills and not “drop out”?</p> <p>Do learners want materials to be more didactic? If so, how can learners be helped to configure their own learning to meet their needs for structure?</p> <p>How is Cyberstep different from elementary school education? What ideas does Cyberstep present about how adults learn?</p>	<p>Same as ESL learners, plus:</p> <p>Are the materials perceived as being too formal?</p> <p>Are the materials perceived as being “authentic”, related to real-life issues?</p> <p>What is the perceived “social meaning” of Cyberstep materials as opposed to classroom instruction? (exploration of locus of control in self-directed learning)</p>

Appendix B1, continued

Learner Characteristics	ESL Learners	ABE Learners
Technology Competencies	<p>What mechanical (keyboard) skills do learners face in using materials?</p> <p>If learners face keyboarding skills problems, what kinds of support would help them overcome these (e.g. built-in typing practice programs)?</p> <p>What conceptual problems do learners face in getting a picture of the structure of the materials (e.g. site map for web sites)?</p> <p>Are there any access or software problems which interfere with users' use of the materials? If so, are these amenable to on-line guidance? If so, what are implications for Cyberstep recommendations re hardware specifications?</p>	<p>Same as for ESL learners</p>
Support Networks for Learning	<p>Same as for ABE learners, plus:</p> <p>Does the material present strategies to make use of language helpers in building English skills (e.g. friendly employers, children, neighbors)?</p> <p>Does the material have built-in resources or links to provide native language assistance (e.g. automated translators, native language audio track)?</p> <p>How useful are bilingual learning support facilities which are incorporated?</p> <p>What would make them more useful?</p>	<p>How attractive are links to “virtual communities” which are embedded in the materials to persons with good support networks vs. those who are isolated?</p> <p>How often do users with or without support networks participate in “virtual communities” and what do they say about their experience—what did they learn?</p> <p>What would be needed to make “virtual communities” more attractive or more useful for skills development? Are tutorial/help facilities (if any) easy to access and use? Do these help facilities do the job (i.e. help people overcome problems)?</p> <p>Do materials engage other family or household members in learning or in activities which support the learner's skills development?</p>

Appendix B1, continued

Characteristics	ESL Learners	ABE Learners
<p>Level of Motivation</p> <p>Learning Objectives</p>	<p>Do the materials incorporate exercises to help establish learning objectives for learners who are unclear? If so, how useable are they and how useful are they?</p> <p>How appropriate or responsive do materials seem to learners with already identified learning objectives?</p> <p>Do materials help learners think about their personal potential/horizons in new ways?</p> <p>Do learners feel more confident that they can succeed in learning effectively after exposure to materials than previously?</p> <p>Do learners think that Cyberstep materials will take them a significant distance toward achieving their goals? If not, what additional learning or skills development should be built in?</p>	<p>Same as for ESL learners, plus:</p> <p>Are the materials judged to be relevant to the interests of negative learners (e.g. mandated participants, those with negative prior adult education experience)?</p> <p>What topics seem less relevant to which sub-groups?</p> <p>What topics seem more relevant to which sub-groups?</p> <p>Which design characteristics (instructional methodologies) seem most enjoyable and useful? Which are least enjoyable or useful? Do enjoyment (attractiveness) and utility go hand-in-hand or are some less enjoyable activities worthwhile after all?</p>
<p>Resources/ Barriers for Skills Development</p>	<p>Are there problems using Cyberstep materials for home-based learning?</p> <p>What are the benefits of using Cyberstep materials for home-based learning? How could these benefits be enhanced?</p> <p>Are Cyberstep materials judged to provide learners with new ideas about how to learn?</p> <p>What additional help or resources do learners think they would need to use Cyberstep as a venue for ongoing self-directed learning?</p>	<p>Same as for ESL learners</p>

Appendix B2: Aspects of Standards Frameworks Likely to be Influenced by Adult Learner User Group Characteristics.

The research questions outlined in **Appendix B** are, of course, simply one facet of the overall formative research design effort which must address, in addition to these specific practical questions as to how materials work for different sub-groups within the customer base, explore the extent to which actual materials conform to the standards specified in the Task 2 framework. Particular aspects of the standards framework which are likely to be explored for different sub-populations of adult learners include the following:

Framework	Implications for Different Learner User-Audience Segments
Integration of SCANS and EFF Standards	The SCANS and EFF framework do not include details on which types of competencies are most needed by which sub-populations of adult learners. It will, nonetheless, be useful to explore, for each module being tested, whether learners are being presented with a balanced menu of skills development support and whether they seem themselves as developing the kinds of competencies (e.g. teamwork) which instructional designers believe they have built in to the module.
Learning Principles	Successful formative evaluation will, of necessity, require attention to whether the eight learning principles articulated in the Task 2 document are successfully utilized in developing Cyberstep materials. Ideally, special attention will be given as to whether these principles have been successfully followed – as perceived by different sub-groups of learners. For example, Cyberstep provisions for adult learners to self-assess their current knowledge and skills and evaluate progress may be more useful for some sub-groups of learners than others. While the process of testing compliance with each of these eight learning principles (and the bulleted sub-items under each) would be burdensome and quite possibly redundant, it will be useful in each formative research cell (e.g. testing Module 8 of the Tierra de Oportunidad materials with a focus group of Mexican elementary school dropouts including both long-term U.S. residents and recent arrivals) to use the eight principles as a checklist to generate research questions.
Learning Strategies	Instructional designers will be able to address only a limited sub-set of learning strategies in each particular Cyberstep module. Thus, the specific research questions to be explored while be developed for each specific module being tested. Nonetheless, a general procedure should be that the Cyberstep Learning Strategies list be used as a checklist to generate the appropriate research question as to whether learner sub-populations recognize that they have been exposed to this material and whether they, in fact, “got it” (e.g. using charts, tables, and graphs to make information easier and faster to understand).

Appendix B2, continued

Framework	Implications for Different Learner User-Audience Segments
Embedded Assessments	The Task 2 framework implies that all (or at least most) modules will include assessment utilities for learners. Particular attention should be given to the possibility that sub-groups of learners may vary significantly in their perceptions regarding the utility of these assessment utilities. One particular area of interest will be whether assessment exercises incorporating what are referred to as “integrated tasks” (which are highly desirable in principle) are clear enough for the lowest literate sub-populations of Cyberstep users.
Interfaces	Many of the interface principles articulated in the Task 2 framework are so sound that there is not much point in devoting precious formative evaluation research resources to testing them. However, it is worthwhile to note that designers’ approach to some issues may need to be tested. For example, Section 2 of the Interface Section of the framework notes that metaphors are expressed in graphic representations; it will be useful in cases where there is the possibility of cultural inappropriateness or misunderstanding to briefly check whether visual metaphors “work” for all sub-groups of learners. For example, the 1987 immigrant legalization campaign made a terrible mistake in using a metaphor built around “not missing the train” to reach populations whose only experience was with buses, vans, trucks, and perhaps, air travel. Several of the general areas of the interface framework which can be expected to be particularly fruitful in generating priority research topics include: navigation, directory/site map format, site search utility, appropriateness and utility of animation sequences, appropriateness and utility of video sequences, and social meaning of virtual reality segments and collaborative environments. Design features which can be expected to generate the most variations in acceptance and utility for different sub-groups of learners are the most advanced ones such as animation sequences, virtual reality environments, and collaborative environments. This means that where modules include such components, it will be worthwhile to examine fairly carefully how well they work for diverse audience sub-populations. In terms of general strategy, it may be most efficient to explore issues relating to interface in sessions separate from those relating to “content” issues.

Appendix C. Appropriateness of Method to User Group and Issue

Method	User Group Concerns	Recommended Application to Cyberstep and number of respondents
<p>Paper/desk review of the product or product potential</p> <p>Data: Opinions and Reflections</p>	<p>More appropriate for Instructor or Institutional User stakeholders. Requires knowledge of research, product review protocols, and orientation to the delivery system</p>	<p>For use in review of product concept and beta test findings. Opinions and reflections on individual product, how it fits into curriculum, what it's likely to yield in terms of outcomes, what information is needed to support adoption, what supports are necessary for successful use, and specific concerns.</p> <p>Respondent n: Represent key stakeholders, 1 per group</p>
<p>Surveys</p> <p>Data: actual and potential users attitudes, product orientations, usage inclinations, with background and experience</p>	<p>Of low utility for user groups with low literacy. Requires understanding of survey protocols. Requires very clear, straight-forward questions. Not good for people who have cultural practices inhibiting expressing opinion</p>	<p>For use in Beta test, or, combined with other methods, for use in Alpha test. Most useful for Instructors and professional educators.</p> <p>For learners, can be used as a learning tool as part of the curriculum. Probably requires accompanying interview or instructor intervention. Can be combined with focus group for group administration.</p> <p>Respondent n: Survey about twice as many respondents as needed to obtain a complete set. Survey about 10 respondents for every user cell (i.e. user issue and user segment). Popular surveys take no more than 20 minutes.</p>
<p>Interviews or one-on-one meetings</p> <p>Data: attitudes, reasons for behavior or performance, predictions. Not for performance or actual frequency or results.</p>	<p>Good utility for all user groups Requires interviewers experienced in working with user group. May have to speak other languages than English. Using instructors may prejudice results. For those respondents of low experience with research, experience may be frightening, and they may withdraw</p>	<p>For use in evaluating proof of concept. Combined with other techniques, appropriate for Alpha test. Most useful for limited use with learners, in combination with performance observation, for the product concept phase or for crucial product concerns. Very labor intensive and expensive. Can combine with focus groups, observation of use, performance interpretation/analysis.</p> <p>Respondent n: Need about 10 interview for every user cell (i.e. user issue and user segment). Interviews should go no more than 20 to 30 minutes to retain users attention. May have to be less.</p>

Appendix C, continued

Method	User Group Concerns	Recommended Application to Cyberstep, and number of respondents
<p>Group interviews or focus groups</p> <p>Data: brainstorming, comparison across 2 user groups, attitudes, reasons for behavior or performance, predictions. Not for performance or actual frequency.</p>	<p>Can inhibit frankness depending on who is in group. Some user segments can't combine in one group for interview—English language facility, 16 to 25 year old men and women, different language groups—because of sensitivity of respondents or difficult translation procedures</p>	<p>For use in alpha and beta tests: Less expensive than one-on-one. Most useful for attitudinal and product use questions. Can be combined with performance interpretation or observation as a debriefing element. Can administer short questionnaire at the end or the beginning, to obtain demographic and other post-recruitment analysis questions.</p> <p>Respondent n: Groups of 6 to 10 work well. Groups of 12 and more work less well. Most focus groups are homogenous—one user group segment opinions on a product. Can use a divergent focus group approach (i.e. combining youth and adults for analysis of appropriateness for intergenerational learning contexts). This can get double bang for buck.</p>
<p>User observations</p> <p>Data: level of use, attitudes toward use, types of outcomes. Not frequency or incidence of use ongoing</p>	<p>Tends to restrict data collection to the technology cognizant. Requires bringing technology phobic users up to speed before can observe their use. Tends to restrict data collection to classrooms and other formal learning environments.</p>	<p>For use in alpha test. Should be combined with one-on-one interview. Hard to do in group format. Useful for trying out fundamental product solutions with group of experienced adult education participants. Useful for seeing support necessary for bringing non-technology users into product use. Useful for seeing in limited trial what it would take to use in non-traditional environments.</p> <p>Respondent n: 6 to 10 individual observations for one user issue</p>
<p>Performance captured by the technology application</p> <p>Data: incidence of use, level of use, use patterns, and results. Not attitudes or interpretations for behavior.</p>	<p>Shy user performance won't mean much. Performance context will influence behavior--Users may be keyed into using the product in a certain way. Restricts data collection to the technology cognizant. Requires bringing technology phobic users up to speed. Tends to restrict data collection to classrooms and other formal learning environments.</p>	<p>For use in alpha and beta tests, with agreement of user. Should be combined with group interview, in Alpha Test at least, to assist in interpretation of findings. Useful for seeing if resources are used, and how they are used. Useful for examining level of performance at intake and later. Useful for ongoing data collection and analysis.</p> <p>Respondent n: 60 to 100 in order to tease out sufficient patterns. 40 to 60 if performance capture strategic, and users are cued to focus on use of specific lessons and resources.</p>

Appendix C, continued

Method	User Group Concerns	Recommended Application to Cyberstep and number of respondents
<p>Product integrated feedback forms</p> <p>Data: attitudes and orientations, reactions and reflections. Some limited explanations of behavior. Not for incidence of use, results, or actual habits of use</p>	<p>Many users won't use it. Most appropriate to those with higher education, more self-confidence, more techno-savy. Not part of the culture for some targeted users. Need to control for user segment.</p>	<p>For use in Beta test and ongoing data collection. Appropriate for both learners and instructors/facilitators (although different forms would be needed). For learners, could be combined with observation and performance capturing. In this case could qualify comments by their demonstrated performance level (i.e. skill level, performance patterns, and interests).</p> <p>Respondent n: This is more volitional, so harder to control. Of course at least 10 from each user audience segment and stakeholder group would be useful.</p>
<p>Product integrated assignment</p> <p>Data: Performance patterns. Not for attitudes, reactions, reflections, habits of use, or incidence of use</p>	<p>Timing and context of assignment request would have to be captured. Certain groups may be less likely to complete reaction/attitudes component, if one were built into the assignment. Some groups less likely to perform well on written tasks. Need to control for user segment.</p>	<p>For use in Alpha and Beta tests. This would be a volitional activity, programmed into the product, which involves the user in sending a specific assignment to an outside coach for review and feedback. Alternatively, a specific class could agree to provide copies of their products to the development team for review. Could be combined with focus group, observation of performance, or individual interview, to yield more data on what affected the performance. Could have a reaction/attitudes component built into the assignment.</p> <p>Respondent n: At least 10 for an assignment to assess assignment functioning across a homogenous group. At least 5 per additional user group responding to the assignment.</p>

Appendix D: Formative Evaluation Structure Worksheet

	Learner Risk Segment Table 3	Instructor Risk Segment Table 4	Learning Environment Risk Table 9
▪ Web Design			
Access	[Example Older Lower grade level Less exposure to technology Level of motivation]	[Example Less exposure to technology Approach more book-centered]	[Example Hardware/software availability Troubleshooting/problem solving Skill problems]
Navigation			
Ease of Use			
Learner interest			
Skill level			
Learner MIS			
Instructor MIS			
▪ Video Design			
Navigation			
Ease of Use			
Learner interest			
Skill focus			
Learner MIS			
Instructor MIS			
▪ Web TV			
Navigation			
Ease of Use			
Learner interest			
Skill focus			
Learner MIS			
Instructor MIS			

Appendix E: Report of Initial Conversations with Developers Re: Formative Evaluation

Initial conversations were held with each developer group concerning status of plans for undertaking formative evaluation, phase of the development process currently in focus, issues of concern and both budgeted level of effort and initial brainstorming on how Aguirre might assist. The following briefly outlines the product of those conversations. It is our hope and expectation to go further with these conversations at the meeting at the end of October, in New York.

▪ ALMA, October 7, 1999 Conversation with Marion and Alex

Level of Effort and Timeframe:

36 days level budgeted to support task 5 (development of the Enhanced Web Site),
Quarters 4, 5, 6 and 10,

Discussed:

First, we can review of the objectives for the data collection, as far as Cyberstep is concerned, and develop an action plan for the formative evaluation. Based on the formative research already done, and specific to multimedia research, we could help formulate the specific research questions and design a cost-effective way of obtaining the data. The generic piece I keep mentioning, but haven't yet sent out, I'm hoping will be useful as a background for this. I certainly recognize that we don't have enough effort to take on the formative evaluation for you, and, if you hire Jerry Johnston or another evaluator, it could be confusing to have us hanging about. Nonetheless I still feel it would be useful for us to review the action plan and issues related to Cyberstep to see if there is some way to streamline evaluation effort through leveraging benefits from the synergy of developer evaluation activities.

Second, we could assist with instrument development related to at least a sub-part of or a specific issue entailed with the evaluation. I liked your idea of looking at how the materials/approach you developed permeate and impact the organization, and, if this turns out to be a concern useful to Cyberstep, and one that you want to pursue, this is something we should consider. If you are going to collect some data through your own network, we could be particularly useful in formulating strategy and some of the instruments. Part of the approach embraced in Tasks 1 and 2, which will also be recommended in Task 3 as a key evaluation approach, is to design into the Cyberstep materials, utility for collecting data on learner performance, interests, needs, and experience. Providing a desk audit of the alpha web design, or assisting with the development of the specific exercises composing this utility in the context of your web-site also may be something we can assist with.

Third, it may be useful to collect data about the product concept of "Cyberstep" as a whole. And this also may be a role for us. I'm not sure what we're thinking in terms of common look-and-feel, but I note that SCOE and LAUSD also have web-sites in their work plans. From talking with you and the other developers I think a unifying dimensions-how the products work together to form a whole. This is something I'm hoping we'll discuss more in our meeting at the end of the month.

- **LAUSD, October 4, 1999, conversation with Hugo Pedroza**

Level of effort and time frame:

Task 7 (ESL Videos, Quarters 5, 7 and 9): about 26 days

Task 9 (ESL Web Site, Quarters 9 and 10): about 13 days

Task 12 (ESL CD-ROM, Quarters 9, 10 and 11): about 13 days

Discussed:

From our discussion I understood that you have already begun showing the pilot of the videos to learners, through your LAUSD contacts, and are using the feedback to develop scripts which will be shared with your advisory group.

One idea we discussed was getting feedback from outside LAUSD on the videos. As you pointed out, I think one of the important issues you face is what content should be in the videos, the CD-ROM and the Web products. With this in mind, building on your idea of working to obtain feedback outside LAUSD, we could develop a plan for utilizing the videos in script development and work together with John Fleischman's group in examining the implications of the videos for development of the product concept with CD-ROM and Web pieces.

As you pointed out, involving learners in the product concept phase is difficult. We could, however, develop a plan for learner and instructor involvement in Web and CD-ROM concepts, perhaps by piggybacking on some of John's work and building on the initial feedback you've received on the videos.

If you think this is a good idea, I can develop this thought further so that we can talk to John about it in the October meeting. He is, I believe, beginning work on the web authoring tools, so this might be very timely for all concerned.

- **SCOE, October 4, 1999, Discussion with John Fleischman**

Level of effort and timeframe:

Task 4 (WWW Authoring Tools, Quarters 4 and 5): about 3 days

Task 6 (CD-ROM Authoring Tools, Quarters 7-9): about 3 days

Task 8 (WWW Learning Resources, Quarters 9 and 10): about 11 days

Task 10 (CD-ROM Learning Resources, Quarter 11): about 13 days

Task 11 (WebTV Pilot Test, Quarters 10 and 12): about 24 days

Discussed:

From our conversation I understood that you have just completed a pilot test of the Web TV technology prototype, with 8 lessons put into 10 learners' homes. The data are now available but haven't been analyzed. It would be great to see the instrument on this and discuss results from it. Given that you've already done so much, I'm not sure we could add much value to this for you and your staff., but maybe we could add something in terms of reviewing the interpretation and meaning of the findings for what features would support use of the WebTV strategy and the further testing for Task 11.

We also discussed that you are beginning to work on the design shell for the web authoring tools, but that you haven't yet talked to teachers or learners about it. Suggesting or validating approaches and strategies

for feedback and support methods may be something we can usefully contribute. I understand your horizon for this task is by the end of October you plan to have a strategy in place.