THE IMPORTANCE OF ITERATIVE DESIGN IN COLLABORATIVE EFFORTS FOR EDUCATIONAL RESOURCES: A CASE STUDY OF THE PLANT INFORMATION CENTER (PIC) WEBSITE

by
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This case study of the Plant Information Center (PIC) Website examines the effect of usability testing and iterative design on the methods of communication and collaboration when designing educational systems for children. Interviews were conducted with PIC members responsible for the design and development of the website as well as the usability test preformed in order to gain insight regarding the impact of iterative design on the development process. Data analysis suggests that the usability test was beneficial to the redesign process and also had positive impacts; increasing the group members' awareness of the potential benefits from collaboration and increasing the amount of subsequent collaborative activities among group members.

Headings:

Children's resources --Electronic

Collaboration

Participatory Design

Usability Testing

Information System Design

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1. Introduction

Electronic educational software has seen an incredible evolution over the last two decades. This is largely due to the development of relatively inexpensive microcomputers and personal computers (PC's) such as the Apple IIE and the first IBM desktop systems. With the advent of the graphic user interface (GUI) the call for educational software at the K-12 level blossomed, as did the challenges to software manufacturers needing to satisfy demand, as well as educators, who were now required to evaluate software that best fit their individual (both educator's and student's) needs. Finally, understanding of the needs of children in relation to electronically based educational resources was also far from complete, on both the development and the implementation fronts. In particular, since most of the educational software available was labeled as an "educational game", teachers were generally very reluctant to incorporate this type of new media into the classroom.

With the advent of the Internet in the mid 1990's and its increasing availability to K-12 schools along with new access to inexpensive personal computers, there was a trend to substitute more traditional teaching materials with electronic resources. Unfortunately, the content and quality of these materials was often questionable, at best. Either the programs produced lacked sophistication or were too advanced –and thus not usable to the majority of educators and students. However, as the capabilities of personal computers and Internet bandwidth expand, and demand for quality electronic resources for K-12 students increases, several academic institutions have taken up the challenges of developing these systems.

One of these projects is currently under development at a major public research university. The Plant Information Center (PIC) is a collaborative effort between the School of Information and Library Science (SILS), the university's botany department, the university's Botanical Garden, and an area middle school. One of the main goals of this project is to help teach middle school science curriculum through a comprehensive web-based interface. The overall goal of the developers is for PIC to be a valuable teaching resource for middle school children as well as a comprehensive tool for use by the community, amateur botanists, and professional botanists in academia.

Development of a collaborative effort such as PIC is definitely a complex task, as the main objective of this kind of undertaking (designing a useful teaching resource) is subject to potential setbacks caused by miscommunication between the various participants in design. As the number of multi-participant projects increases, the task of communication among designers, developers, and user groups becomes more dynamic and critical. Using PIC as a case study, the purpose of this paper is to answer the following question: How does iterative design impact collaborative efforts in developing an electronic educational resource for adolescent science students? Results from interviews involving the project staff suggest that usability testing has proven to be a necessary process to insure successful design. Moreover, while initial participation of the user-group was not fully utilized, a higher degree of communication and collaboration involving end-users in the redesign process has been achieved.

2. Literature Review

2.1 Introduction

In order to understand the complex nature of the collaboration and communication involved in the PIC project, it is necessary to take several fields of study into consideration. As noted, the system was designed to be comprehensive enough for professional as well as novice use, for the purpose of this study, however, I focus only on those aspects dealing with the user group involved in the first usability study (children). The second facet of this paper –that of participatory design, is highlighted by research regarding not only user involvement in the design process, but also how this involvement facilitates the overall design process. Finally, I have selected research that focuses on the role of communication in collaborative projects and the important role that it plays in multi-disciplinary projects such as PIC.

2.2 Information needs of Children

While there has been substantial research involving the learning process of children (most notably Piaget & Inhelder 1969), it was not until the 1990s that research asked specific questions about the information needs of children, and how they access this information (Hirsch 1998; Large, Beheshti, Moukdad 1998; and Fidel, Davies, Douglass, Holder, Hopkins, Kushner, Miyagishima, & Toney 1999). Studies regarding the information needs of children, most recently Large & Beheshti (1999), attempt to shed light on the issue of how new technology either enhances information seeking behavior or detracts from it (Large & Beheshti 1999). Other studies, not as recent but no less important, performed by Kuhlthau (1988), Walter (1994), Gross (1995), and

Solomon (1993), address the types of information needs of children. It is important to note that the majority of this research deals with how children determine the relevance of information obtained through an electronic medium (the Internet) when faced with an imposed query (searching for answers to required questions rather that voluntary searching for research of ideas) and their searching patterns (browsing) in respect to the Internet as a whole, not necessarily an individual site.

2.3 Relevance Determinations of Children

An additional facet to this question- that of relevance of information- is also addressed in the literature. Studies by Barry (1994), Watson (1998), and Cool (1997) take up the issue of how students determine the relevance of information and the medium in which it is presented (text vs. digital). Finally, extensive research has been done on the searching patterns of the user-group (children) from the following authors: Hirsh (1997); Schacter, Chung, & Dorr (1998); Marchionini (1989, 1995); Borgman, Hirsh, Walker, Gallagher (1995); Large, Beheshti, Breuleux (1998); and Bilal (1999). Most of the recent work has been done with a focus primarily on electronically based information; this shift in focus is important in the sense that it may indicate an increased tendency by students to search exclusively from this type of data.

2.4 Organization of Information and Usability Design

The incorporation of usability theory from the onset of design is an important issue. Research performed by Crerar & Benyon (1998) establishes some principles and rationale behind usability as part of design. This emphasis is important primarily because

without usability testing from the beginning, many problems may occur that cause the product development cycle to be unnecessarily long and ineffective. Interestingly, additional research by Saunders & Arnfeld (1998) suggests potential problems in finding the "right balance" of involvement between the usability group, engineers, and the users in the User Centered Design (UCD) process. Work by Noyes & Baber (1999) provides a strong methodological background for usability design and usability testing –especially with regard to collaborative projects.

At the same time, research has been done to determine the effective information architecture with regard to website usability (Gullikson, Blades, Bragdon, McKibbon, Sparling, & Toms 1999). This research concludes that navigational aids play a crucial role in the effectiveness of a website, highlighting the importance of these tools to the overall satisfaction the user feels with the site. The research validates design conventions (Yale Style Manual, 2001) which suggest that an effectively designed website strikes a balance between the number of initial options a user has from the starting point (homepage), and the overall depth of the site itself. An informal standard of two mouse-clicks to reach the desired information or goal is regarded as optimal from system design.

2.5 Collaboration, Communication, and Participatory Design

It can be argued that the areas of collaboration and communication are inherently connected. In this sense, the better the communication –the better the collaboration (and vice versa) (Kraut, Galegher, Egido, 1988; Allen, 1993; Saunders & Arnfeld 1998). This holds true in the area of participatory design, as well. By involving all groups in the design process (engineers, end-users, and "management"), significant increases in

usability and user satisfaction can be observed (Mumford, 1993; Holtzblatt & Jones, 1993; Sonnenwald, 1996). This process, while seemingly slow at times –especially with regard to creating user profiles, can actually speed up the design process of many collaborative projects, as it obviates the need for extensive system renovation and redesign (Mumford, 1993, 1995; Grudin, 1993; Sonnenwald, 1995). The negative consequences of ignoring the needs of any of these groups in the design process can be seen in some earlier information systems designs (Bravo, 1993).

Finally, interesting studies have been performed regarding the effects of distance on collaboration and multi-disciplinary projects (Hersleb, Mockus, Finholt & Grinter, 2000). While there are some similarities between the PIC project and other collaborative works, PIC is unique in the sense that its origin is academic in nature –not corporate. This has interesting effects on the overall goals of the project. Since the funding of PIC largely (if not entirely) comes from grants, the goals of the project are slightly different from projects that are profit driven. This has important ramifications on how collaboration takes place (Grinter, 1997).

2.6 Summary

In order to understand the impact of communication on collaborative projects such as PIC, it is necessary to look at the principal parties involved in creating such a system, as well as the people for whom it is designed. By understanding the information needs of this user group(s), communication can and should be tailored to effectively facilitate design. I believe that the iterative design process inherent to participatory

design plays a fundamental role in this communication as well as naturally complimenting collaboration.

3. Methodology

3.1 Setting

The goal of PIC is to share scientific information to professional botanists as well as provide botanical information to the general public. Perhaps one of the strongest themes of the PIC project is education. The objectives for the PIC as stated in the goals of the Institute of Museum and Library Services (IMLS) grant (1999) are:

1. Demonstrate a successful cooperation between the university, the public school system, and the public library;
2. Create and test an interactive Plant Information Center for the general public, libraries, and public schools;
3. Develop educational experiences using primary research materials from the herbarium for 6th grade students;
4. Test the usefulness of digital images of herbarium specimens for plant identification and for inspiring the public and public school children with the aims and methods of professional botanical science

In order to satisfy these objectives, the website provides a wealth of information and tools for teachers and students at the K-12 grade levels. The PIC system incorporates an image search and retrieval database (BOTNET), interactive plant identification keys, frequently asked questions, teaching materials, glossaries, and general botanical information. These tools are organized under a central PIC "portal" that serves as the primary access point for users. Each tool has a hot link to a brief description of its purpose (designed for first-time users navigating the site by browsing), and can be accessed directly, as well (for users who have previous experience with the site). Additionally, there is a keyword search box available from the main page linking directly

to the image database (BOTNET). A site map is also available; however, a search function of the site itself is not yet available.

The Plant Information Center is a cooperative project between four main groups at the University of North Carolina at Chapel Hill: the Botany Department, the School of Information and Library Science (SILS), the North Carolina Botanical Garden, and area middle schools. There are three principal investigators (PI) involved in PIC. These PI's are from the SILS and the Botany Department faculty, and were responsible for the initial grant proposals related to PIC as well as for current funding projects, as well as leading the project's bi-monthly meetings.

In addition to the PI's, there is a full-time project manager. This individual is responsible for helping to organize PIC meetings, creating the meeting agendas, recording meeting notes, performing administrative responsibilities for the project, and interfacing between the various departments and organizations involved with the PIC project. PIC also employs several graduate students –although the number of which is subject to availability and funding resources. These graduate students have worked on website design, database creation and maintenance, specimen imaging, and consulting. An essential component to the PIC staff (although not formally employed by PIC) is composed of area middle school students and a primary contact teacher. This teacher provides student volunteers, lesson plans, and vital feedback regarding site design, and is one of the original members of the PIC team.

This study focuses on the communication methods used to complete the initial design as well as the ongoing development of the PIC website. In particular, it examines the current methods of communication and collaboration between the four groups. This

type of focus allows an analysis of communication and collaboration channels and methods, and highlights any problem areas.

3.2 Data Collection

All members of each of the four principal groups were interviewed to determine the level of success and ease with which communication influenced initial design, as well as to record each participant's opinions on how iterative design has impacted design and redesign of the PIC website. A total of 10 out of a possible 13 interviews were conducted, representing a 76% of the original PIC development staff. The average length of each interview was approximately 30 minutes. The interview consent form and the protocol during the interviews are available in Appendices A and B.

Interviews with specific individuals in each group responsible for design decisions and design processes are particularly relevant to this study. Therefore, these people were interviewed about the rationale behind their design decisions and the main methods of communication and collaboration involved in the project. These individuals included the original grant writers as well as the principal investigators from each department (where applicable). Individuals under the supervision or direction of these project leaders were also interviewed. End-user input was analyzed as part of a previously performed usability test of the PIC site (Dopke & Carlson 2001).

Once this stage was complete, separate, semi-structured interviews were conducted with individual group members regarding their opinions on how iterative design/usability testing has impacted the design and evaluation process, communication, and collaboration related to the project as a whole. Detailed notes were taken during each

interview and each individual session was tape-recorded to insure quality of data collection.

3.3 Data Analysis

Interviews were transcribed in order to maintain high data integrity during analysis. An examination of each interview determined commonalities and trends in preferred communication methods (email, face-to-face, formal and informal meetings, etc.), collaboration successes and failures, and the level of participation of the individual in the project. After these trends were identified, questions regarding the impact usability testing on these methods were analyzed and a comparison was made between the pre- and post- test levels of communication and collaboration. Specific events described in the interviews were used to highlight specific events of communication and collaboration success and failure.

3.4 Limitations

Some research limitations apply, as I was involved in the initial design of PIC. While my role was somewhat minor, I did perform the initial usability test on the PIC website. I also served as an educational consultant at various stages of the site design. I presented the results of the first PIC usability test at the WebNet 2001 conferences, which were then published in the conference proceedings. The findings of this test indicated that the original interface was not intuitive for the user group. This information was presented to the PIC administration for consideration prior to publication. I then left the project and am no longer employed by PIC -occasionally serving a minor role as usability consultant

to interface redesign. This work gave me insights to the communication structure of PIC at that time. This is both an advantage and disadvantage; the previous experience provides additional insights but may have biased my data collection and analysis. Replication of this study in a different context is necessary to address this issue.

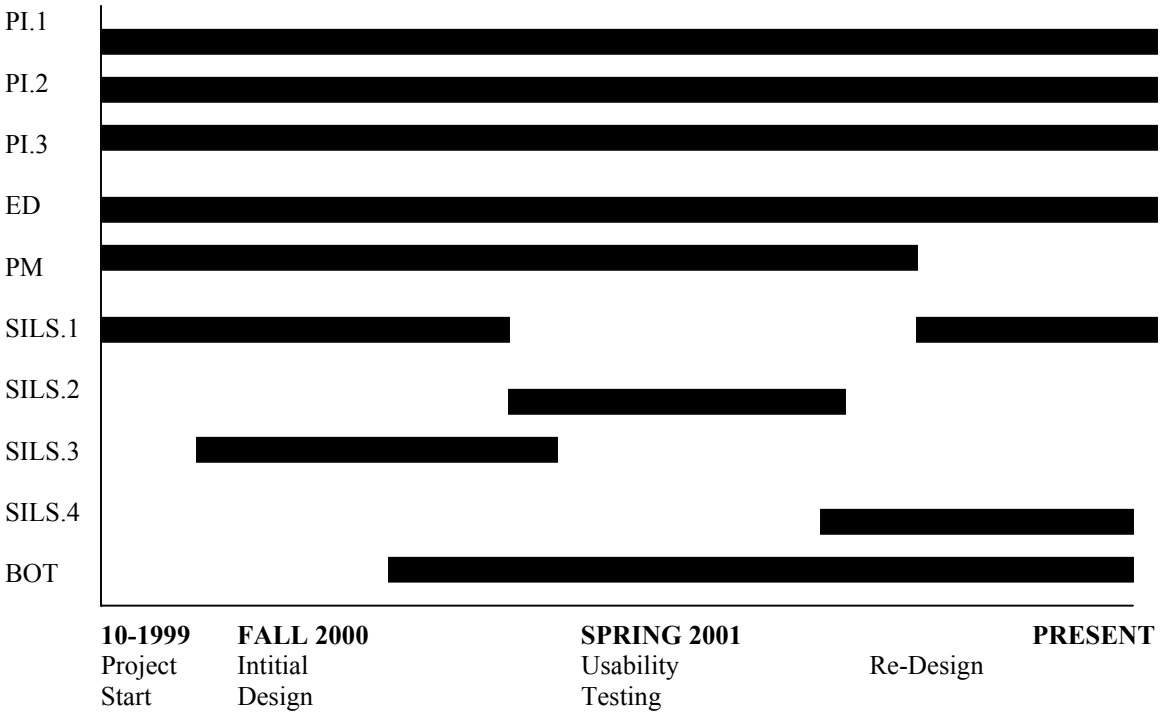
Since the original testing occurred in the spring of 2000, there has been a significant amount of time that has passed before these interviews took place. While it is difficult to measure the exact impact this has had on the memories of those interviewed, it is nonetheless important to note. On occasion, a response such as "I don't recall exactly" was not uncommon or unexpected. Luckily, there were no serious problems in obtaining the data needed for analysis. Additionally, there was some ambiguity on my part regarding the original perceptions of the test performed. When interviewed, all of the staff involved in the felt that the usability test was beneficial and worthwhile; however, the original perceptions and opinions regarding testing may have been somewhat different to those expressed during the interviews. Again, replication of the study on a different context will help to identify any potential impact the time laps may have on data collection & analysis.

4. Results

4.1 Participant Background

Individuals participating in this study were directly involved in the development or redesign of the PIC project. Table 1, below, displays the approximate length of involvement of these individuals during the development stage of PIC.

Table 1[1]. Individual Study Participant Involvement in PIC Project



While not every participant was involved in performing the usability test on the site, these individuals are in a position to comment on the levels of communication and collaboration (pre-test, post-test, or both) within PIC. The variation among the participants' professional background is quite extensive. Individual's prior professional experience includes architecture, programming, teaching (elementary to college level), and consulting as well as other fields. As far as involvement with the PIC project is concerned, the following grouping applies to participants interviewed:

Principal Investigators: 3
Student Employees: 5
Project Manager: 1
K-12 Educator: 1

[1] Where: "PI" =Principal Investigator, "ED" =Educator, "PM" =Project Manager, "SILS" =SILS Graduate Student, and "BOT" =Botany Graduate Student.

All participants have considerable experience with collaborative efforts and projects; however, there is a noticeable difference between those individuals who have a corporate background (e.g. IT contractor, legal assistant, architect, IT developer) and those who are more academically oriented. This is relevant in the sense that while corporate collaboration is profit-driven, academic collaboration is research-based.

All participants were asked if their responsibilities to the project changed or if they remained the same throughout. While most participants felt that their duties to PIC remained more or less stable, some of the principal investigators stated that due to staff turnover administrative roles often had to be shuffled or re-assigned. This last point is particularly relevant in the discussions regarding communication and collaboration.

4.2 Communication

When asked to describe the main methods of communication for the project, participants agreed almost unanimously that these were email and bi-monthly group meetings. The impression of the content of this information seems to vary somewhat among participants. Email communication was seen as the most efficient means of contacting PIC members, as well as communicating "nuts-and-bolts" information such as setting up meeting times, defining project objectives, and answering specific scientific questions (this was used mostly during the creation of the object model for the database in the early stages of the project). Email also was used in the later stages of design to evaluate stylistic changes to the PIC website, as well as to evaluate the content of the various tools presented to the user from the website.

While email was ranked highest for efficiency, participants saw face-to-face communication as the most substantive method. That is to say, where as email was used mostly for coordination, face-to-face interaction during meetings was invaluable for project completion. As one participant explained:

> the email [was important] as a way of getting us all together and commenting on things between meetings, but it's the meetings that we really accomplish things.

Perhaps the richness of this kind of communication is most important at the onset of a collaborative project such as PIC, where brainstorming activities are most commonly used. This is illustrated by the following exchange:

> *Based on your observation experiences, how did the different groups in the project work together to create the end project?*
>
> They worked well, but how they did it…a lot of the face-to-face meetings –they worked because people listened to other people, they were very respectful of what they brought from their experience. I think it worked in the sense that everybody brought a piece that everybody started putting together as a puzzle right there in front of you about this whole idea of what it was.
>
> *So would they bring a finished product and then people would try to figure out how to put it together or would they bring concepts?*
>
> I see it more as it was before the product stuff. It was the philosophy, the concepts, the ideas that bonded people together and then later the finished products really came out of that. But I really liked the whole idea that people would just talk about well 'this is what I thought it could be or what it might be or this is what I was thinking it could be,' and it was just a lot of great ideas.

While overall participants considered communication very effective, there were some areas of communication breakdown. Rather, at times, some participants expressed that the bi-monthly meetings did not seem adequate. Given the distributed nature of

communication in any collaborative effort, the perceived breakdowns in PIC seemed to be related to this fact.

> Based on my experience as compared to earlier in commercial software, we interacted far less frequently. Typically a project like this would meet once a week once it is underway and then every day. But the logistics were different with this…I think that it's due to the fact that we didn't all work in the same building everyday.

This seemed to be the case at the onset of development as well as after staff turnover[2] - especially with respect to the period between project coordinators for the project.

> in the period between coordinators we sort of dropped the ball in terms of staying connected.

Since some individuals (particularly graduate students) would often work on facets of the project, when administrative personal responsible for coordinating these facets left the project the impacts on communication seemed to have greater effects.

Interestingly, the group furthest away physically –the middle school teacher and students, did not perceive any major communication breakdowns at all. When there was any ambiguity regarding the project's status, email was used to clarify the situation. Overall, communication between group members was regarded as productive, especially between the primary investigators responsible for writing the original grant as well recruiting potential team members.

4.3 Collaboration

In general, it appears that collaboration among all project members was achieved through email and group meetings. In addition, smaller "team" meetings also played a

[2] Given the academic nature of the PIC project, graduate students were often employed as development staff. During the course of the project, several of these students graduated from the various departments, and then other graduate students would fill their positions.

significant role. An example of this could be a PI meeting with SILS students involved in the data entry of image specimens into the database, or the project leader meeting with a botany student and a PI in order to solve a problem with equipment. When asked what were the most important strategies of collaboration for the project, effective communication between subject matter experts was a recurring theme. Also, communication between the different groups responsible for developing the individual facets of the website was considered to be crucial. Clearly defined roles and objectives for development helped to avoid "project creep" and overlap to a certain extent.

This project was constructed in an academic environment with professors and students comprising the majority of the project employees, study participants reported that the academic calendar had an impact on their collaboration and project outcomes. In particular, the academic calendar competed with the project and introduced constraints and delays.

> Unfortunately the collaboration is kind of on again off again –I saw that from the beginning. You get very busy especially during the semester -starting [with] exams. You're not going to have time for the project. But then when you do have time there is a lot of hustle. So, from my own perspective it was frustrating not seeing things get done; but at the same time, from a university perspective things did get done and were actually done pretty accurately and quickly.

Perceptions regarding the overall level of involvement of the groups in the design process of PIC displayed a consistent –albeit unfortunate- pattern. When asked to assign a percentage value to the level of involvement of developers, designers, and end-users, the majority of participants assigned the smallest value to the end-users. The following table displays these results.

Table 2. Perception of Involvement

Job Category

Study participants	Developers	Designers	End-Users
SILS	40.5%	43%	17%
Botany Department	42.5%	42.5%	15%
Educator	33%	33%	33%
Average	39%	40%	21%

From this data, it appears that there is an almost even distribution in the level of involvement between the developers and designers, with the end-users being under-represented in the design process. While definitions of each group differed between those interviewed, all recognized the end-user group to be representative of middle school students and teachers.

> I wasn't aware of any input from sixth graders or teachers, um, actually –I was. I'd give them about five percent –but it was really far too low. You know what I mean? We went to them for reactions afterwards.

While unfortunate, this low value assigned to end-users is somewhat understandable. The initial goal of the PIC website was to help teach seventh grade science curriculum –a curriculum which originally focused largely on plant biology. This subject matter was cut out as the focus was switched to soil science. Luckily, through the innovation of the main science teacher involved in the project, PIC was implemented as part of a botany "cluster".

> Part of the problem was with the particular teacher we were working with didn't end up teaching the class –the curriculum changed. And we scrambled –luckily in the end we were able to

> pull something together but it wasn't the 150 students [using the PIC website during the normal science class time], it was 8 [students participating in the botany "cluster"].

4.4 Perceptions of the Usability Test

Although iterative design and the concept of usability were not formally established at the beginning of the development of PIC, a usability test was performed using the students involved in the aforementioned botany cluster. This test focused on the evaluation of the navigational aids and the layout of the website, as well as the individual "tools" that were available. Results of this test were presented to the project staff for consideration.

Participants interviewed stated that this test had definitely impacted the design and redesign process:

> on the basis of that usability test we basically threw away the original website and really redesigned the whole thing"

> "It had a big impact. Although the original site was useable, they pretty much scrapped the entire design and started over. It was a very helpful test.

> I think [the test impacted design] a lot, I think quite a bit. I think that day we all watched people really work through it and saw what was good and what was not so good for them. So- and I think from what I've seen since –it started conversations that led to pretty major changes.

As far as having an effect on the level of communication and collaboration on the PIC project, opinions varied somewhat. Several participants reported that communication immediately following the test increased; however, since the test was performed in the spring most of the project members (academics and students) drifted

during the following summer months. Nevertheless, the need for increased participation from the user group was agreed upon. As one participant explained:

> we realized that we do need more input from end users –so we are having another usability test

Methods of collaboration -while largely unchanged with the exception of user-group involvement, seemed to be impacted as well.

> I think there was more collaboration as a result of it. For instance, I was asked to help in a minor capacity, but it got me thinking about how we design the site effectively as a learning tool, and it primed me to thinking in more of those terms as I went along. I think I was able to get some additional feedback [from the users] as the website was developed and have been asked regularly since then about it.

While usability testing was not employed during the initial stages of design, its impact on continued site development and redesign is evident from the data. Plans for future usability testing are definite, and grants have been written with usability testing as a key component.

5. Conclusion

The beneficial effects of usability testing and iterative design on communication and collaboration emerged from the data. The analysis suggests that the level of communication increased as a result of testing, at least in the immediate, and that collaboration among the groups began to increase, incorporating a more balanced approach that included increased user participation. Given the increasingly distributed

nature of collaborative efforts, effective communication among all groups involved is crucial.

As face-to-face communication is not always possible between all groups, the findings from this paper suggest that usability testing provides the important feedback from end-users necessary for effective design. The collaborative nature of usability testing (soliciting direct feedback from the user) may serve to bridge the gaps in communication created by distance and time. Without this feedback, the design process may become bogged down in redesign that could have been obviated. A careful balance must be maintained however, as too much input from one group may result in "project creep" or "feature creep". While the results are specific to an academic project, the idea of the participatory design process and iterative design has become more prevalent in the commercial realm as well. Although the findings from this study are by no means universally applicable to all collaborative projects, important lessons may be learned from the experience of PIC.

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Appendix 1: Interview Consent Form

This study is part of a research project for the Plant Information Center (PIC) Website. The principal investigator of this project (Justin Dopke) will conduct all interviews. During this interview, you will be asked questions regarding your role in the PIC project, methods of communication used during the project, methods of collaboration, and the first generation usability test on the PIC website. The interviews will be scheduled at your convenience and for a duration and frequency that seem comfortable to you. During these interviews, I will be asking you questions about your work, expectations, perceptions, and experiences communicating and collaborating with colleagues involved in this project. The purpose of this interview is to learn about factors that may facilitate and/or impede communication and collaboration in inter-departmental/organizational research projects. If you agree, I will make an audio recording of the interviews and/or take notes during the interviews. The tapes may be kept for a period of up to ten years. Participants in this study will be identified by number to insure that privacy is maintained. I estimate that on the order of 15 people will be participating in this research.

If you have any questions about the project at any time, please call Diane Sonnenwald at (919) 962 8065, or send her a fax at (919) 962 8071, or email at dhs@ils.unc.edu.

Thank you for your willingness to participate in this study. Your participation is very much appreciated. I would like to assure you that as a participant you have the following rights:

- Your participation in this study is entirely voluntary.
- All data will be kept confidential. Your individual data will not be shared with other participants and it will not affect your job, grades, or performance rating.
- Excerpts of the data may be made part of research reports but under no circumstances will your name or identifying characteristics be included in the reports.

If you have additional questions about your rights as a participant, you may contact:

Academic Affairs Institutional Review Board
Dr. Barbara D. Goldman, Chair
CB #4100, 201 Bynum Hall
The University of North Carolina at Chapel Hill
Chapel Hill, NC 27599-4100
(919) 962-7761
email: aa-irb@unc.edu

Please sign and date both copies of this form to show that you agree to participate. Please retain one copy for your records.
Thank you very much

_____

Participant Date

Appendix 2 (Interview Questions)

A. Background regarding participant's participation in the PIC project
What is your professional experience?

What kinds/types of collaboratory projects have you worked on in the past?

Alt: Have you ever worked on a collaboratory project before? Describe it.

How would you describe your primary role in the PIC project?

Alt: What do you do with the PIC project?

What were/are your main responsibilities in the development process?

Alt: What role do you personally play in the development process of the PIC project?

Have these responsibilities changed over time or have they remained the same?

B. Communication
Describe the main methods of communication for the project.

What is the content of this communication?

Alt: Is there one type of communication that is used more frequently for certain types of communication?

Based on your observation experiences, how did the different groups in the project work together to create the end project?

What worked well?

What didn't work well?

In your opinion, what are the most important areas of this communication?

Describe the areas of communication breakdown.

How did you cope with these problems?

Over time, how has communication evolved?
Alt: Has communication become easier/more productive or has it become more difficult/frustrating?

C. Collaboration
Describe the main methods of collaboration between the groups involved in the project.

Describe the main methods of collaboration for the project.

In your opinion, what are the most important areas of this collaboration?

Using a percentage (in your opinion), to what level did the design process involve:
Designers
Developers
End Users

D. Perceptions of a specific event: Usability Test
To what degree did usability testing impact the design/redesign process?

Has the usability test/iterative design changed the communication level between the groups involved in PIC?

Has the usability test/iterative design changed the way collaboration takes place between group members?

Were there other activities/events that impacted collaboration?

Were there other activities/events that impacted the overall level of communication (Either positively or negatively) between the groups involved (SILS, Botany Dept., End Users)?