DocuScope

User Study Report

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Abstract

In this User Study report we describe our team's process for identifying and observing a subset of potential DocuScope users in work-based interviews. We explored a range of potential users across academia, professional writers, High School teachers, and word hobbyists. After narrowing our focus to study university-level writing educators and rhetorical researchers, we conducted Future Scenario and Artifact Walkthrough contextual inquiries with three participants to identify how users currently teach writing and how they could potentially use DocuScope in their current work. This report explains our user study methodology and data collection process for each of the three interviews. The last half of this report details the results of our interviews and focuses on our observations and interpretations of the interview data. We learned that while all users performed both teaching and research tasks, writing education and conducting rhetorical text analysis have differing needs to support. We also learned that users required some form of a demonstration, either online with DocuScope or walking through screenshots to conceptualize what DocuScope is and how it applies to their work. Based on these results, we recommended design ideas for both the DocuScope tool and a DocuScope website.

Introduction

The DocuScope text visualization tool was selected as a project for Carnegie Mellon University's Fall 2003 Online Information Design class. The project goal for this class is to research the information needs of DocuScope's user audience to develop a website for DocuScope. This report presents the findings of our study.

To create a successful website for DocuScope, we had to study users. The primary challenge for our user study was to first identify the audience for DocuScope and then identify how DocuScope supports their current tasks. We studied DocuScope to identify the functionality of the tool and reviewed text visualization research literature provided by our client. We reviewed several potential audiences for the tool such as High School English teachers, High School History teachers, speechwriters, writers, Social Scientists, Rhetoric Academics, and word hobbyists but in the interest of time and our ability to access participants, we decided to focus our study on University-level writing educators and rhetorical researchers.

Next, we conducted work-based interviews with three CMU academics. Our focus in each interview was to identify how they teach writing in their classroom or if they are pure researchers, how they analyze text

and what they look for during text analysis. We also focused on seeking their views of DocuScope in relationship to their work objectives, and on ascertaining their level of computer experience.

This User Study Report includes the following:

- A discussion of our data collection methods
- The results of our interviews
- An interpretation of the results
- Possible impacts of the results
- Design recommendations for DocuScope and a website
- Appendix

Methodology

To identify potential study participants, we researched the course offerings and faculty interests at Carnegie Mellon University and the University of Pittsburgh's social science, business, law, and communications departments. Each team member researched different department web sites to find faculty with text analysis research interests or faculty who taught writing classes or rhetorical text analysis classes.

We then presented this list of over 60 possible participants to our client, who then narrowed it down to CMU faculty whom he collaborates with or who are currently working with rhetorical text analysis. Our client sent out an introductory e-mail to the selected participants, who then responded back to a team member for scheduling details. A team member followed up with the four participants, indicating the purpose of the meeting, duration of the meeting, and letting them know that we would like to videotape the meeting with their approval.

The interviews were limited to two hours and incorporated either a walk-thru of DocuScope screenshots or a brief demonstration of the tool – depending on the user's familiarity with DocuScope. We asked users to think aloud while reviewing artifacts from their writing classes or text from their research.

Subjects

All of our subjects are highly educated with PhDs with access to CMU's broadband wireless network:

U1 is an academic researcher who specializes in political genres. His particular area of interest is an ill-defined area -- personal privacy. U1

has a limited experience with technology and a low level of experience with statistics.

U2 is a professor of management communications who teaches three professional writing classes at the Graduate School of Industrial Administration (GSIA) at CMU.

U3 is a professor of rhetoric who teaches classes on rhetorical analysis at CMU.

Materials

Our interview materials consisted of a background questionnaire, consent form, and videotaping equipment from Instructional Technology. The background questionnaire asked five or so closed questions about the user's PC experience. We also used standard Informed Consent Forms from the Online Information Design class to obtain consent for videotaping the interview.

Procedures

Two group members were allocated for each interview: one operated the video camera and one was the interviewer. The interviewer explained the consent forms and obtained informed consent prior to videotaping. The interviewer also delivered a short one page background questionnaire while the camera operator set up the video equipment.

The interviews were all conducted at the user's office location and were limited to two hours in duration. Our interviews consisted of an artifact walkthrough of user's current work in analyzing text, a demonstration with screenshots of DocuScope and reacting to how DocuScope could apply to their work. All user artifacts were stripped of identifying student information before we received a copy.

Analysis

To analyze the data, our team reviewed the videotape together on a projected monitor. A transcript was not taken, but critical timestamps of the video transcript were documented to obtain user quotations. One team member was responsible for identifying quotations and the rest of the team took note of observations and interpretations. As a group we fine-tuned a set of observations, interpretations, and design recommendations for each user interview.

Interview Results

a. Work Focus and Relevance of Text Analysis

The interviewees are primarily engaged in teaching and/or research, and analyze text for different purposes. Table 1 shows the work characteristics of the interviewees:

	U1	U2	U3
Occupation	Researcher in Political Genres	Professor of Management Communications	Professor of Rhetoric
Nature of work	Research Limited teaching	Teaching Research.	Teaching Research.
Purpose of text analysis	To identify genre of legal texts.	To enhance effectiveness of business or professional written communication.	To identify, check and evaluate text.
How text is analyzed	Look for new genres' distinctive features	Analyze against writing goals, established structures, and readers' context.	Identify recurrences, grammatical patterns, adjacency sequences, figurative language, consistencies, etc.

Table 1: Work characteristics of interviewees

To illustrate how text analysis supports his research, U1 described his hypothesis that argues that there is a relationship between how written and spoken text were used in court arguments and the respective verdicts that they achieved. Parameters that U1 is working on include the temporal categorization (past, present, future) and speaker categorization (first person, third person) of text. Text analysis is just one way U2 uses to help evaluate the effectiveness of business and

professional writing. She emphasized that in her field, effective writing takes into consideration the reader's cultural, sociological, and psychological background as well as the writer's goal (for writing something). Like many of her peers who teach professional and business writing, U2 uses the Socratic and iterative methods for teaching. To U3, there is no standard way to teach and/or evaluate text. She does not have a specific teaching technique but is inclined toward "interpretive techniques."

b. Interviewees' View of DocuScope

The interviewees' view of DocuScope is summarized in Table 2 below:

	U1	U2	U3
Strengths	Can be used as an additional means to validate research hypothesis.	Color elements on interface make category identification easy. Provides feedback during (versus after) the writing process.	Don't know.
Limitations	Text is too small. Meaning of some terms and categories unclear.	Does not embrace some principles of professional writing (e.g. background of the reader). Meaning of some categories unclear. Dictionary does not support professional or business writing.	Relationship of categories unclear. Categories may not cover entire domain of communication.
Will use as research tool?	Yes	Unsure.	Unsure.
Will use as teaching tool?	Unsure.	No.	Unsure.
Will use for other purposes?	No.	Can be used by students to revise drafts before submission.	Unsure.

Table 2: Interviewees' view of DocuScope

While U1 sees DocuScope as a valuable means to validate his research hypothesis, it is not sufficient and needs to be used in conjunction with other validation methods. He is open to using it as a teaching tool but

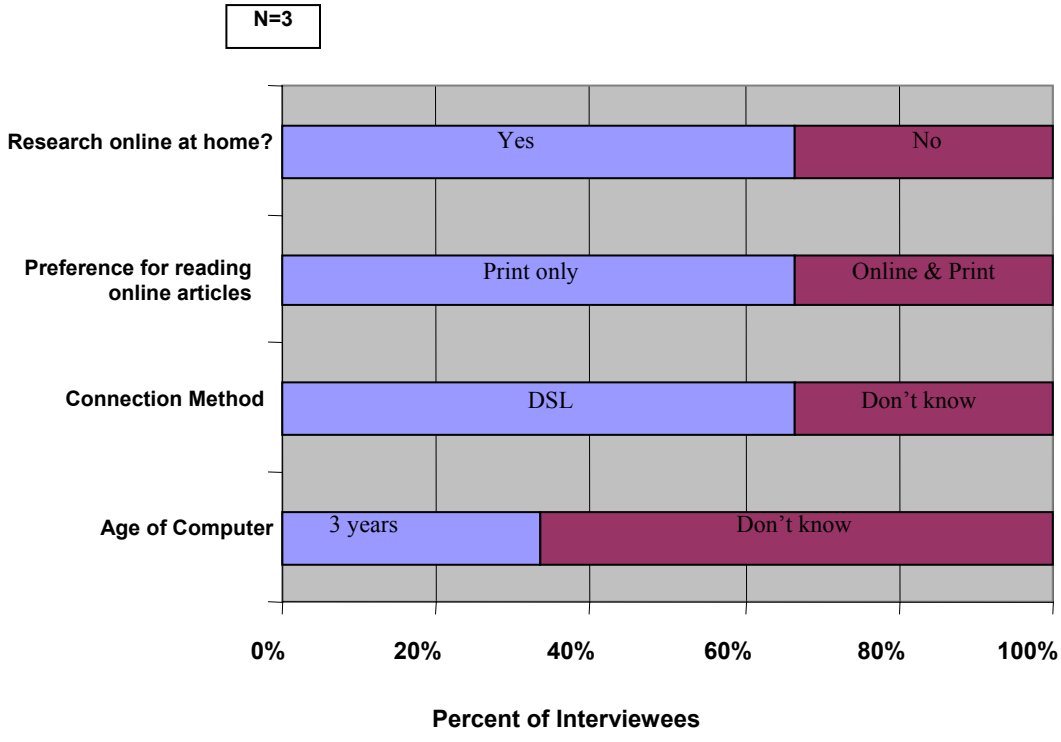
only when he learns how to incorporate it into his teaching methodology. U2 could see her MBA students using DocuScope to improve their drafts, but is unlikely to use it as a teaching tool because DocuScope seems incompatible with her Socratic and iterative teaching methods. She commented that her peers are generally skeptical of technology. U2 is also unsure whether DocuScope is appropriate for professional writing. Professional writing is structured and goal-oriented and its effectiveness involves writing with the reader's background in mind. To U3, there is no standard way to teach and wonders whether DocuScope could provide or is suggesting one. While she is "all for being on the cutting edge", she never uses computers in the classroom because "technology is not very reliable". She understands DocuScope's categories but is uncertain whether the categories map the entire domain of communication.

c. Experience with Computers

The three interviewees share some common characteristics with regard to their experience with computers. They:

a. Use the computer and access the Internet daily.
b. Use the computer in the office and at home.
c. Have PCs (versus Macs)

The following graph illustrates their online usage patterns and their computers' ages.



Interview Results & Discussion

Interpretations, both general and specific, can be drawn from the reported results. The interpretations and their justifications follow:

1. ***Rhetorically-minded users find DocuScope's ability to classify and distinguish between genres useful.***
   U1 stated that his research involved looking "to find a signature for … genre." U1 emphasized to us the importance of voice, time and argument in his work classifying genres, and an analysis of his current techniques bears out this statement. Voice and time, as U1 defined them, are categories that DocuScope can currently distinguish. As a result, DocuScope currently meets a well-defined need of U1 – and so this particular capability is of value.

2. ***Rhetorically-minded users want DocuScope to provide quantitative support for analytical arguments.***
   U1 stated that he was interested in using DocuScope's statistical methods of textual analysis as quantitative support for his research – he intended to use DocuScope as a repeatable and verifiable tool to support his findings related to the texts studied. U1's need in this area illustrates DocuScope's potential value as a scientific instrument, just as useful for mathematical verification of conclusions as for initial discovery of these conclusions.

3. ***The current prototype is a useful tool in its current state*.**
   U1 stated a desire to use the current prototype demonstrated to him. He believed that the current prototype appears to be of sufficient value to be immediately useful to him – U1 volunteered to test-drive a prototype in the near future. It can be inferred that the tool, even at this early stage, is perhaps worth putting in some specific, special users' hands as-is.

4. ***Different types of users are skeptical of DocuScope for domain-specific reasons. They will need tailored demonstrations.***
   Both U1 and U2 supported, either directly or indirectly, the notion of a demonstration. For U1, this is inferred from his position that DocuScope cannot become of use as a teaching tool in the classroom unless it has proven to him that it has useful abilities. U1 said, "If it's something that would add value to what I'm doing, I would certainly be interested in using it to teach."

U2 was much more direct, saying that a demonstration would be completely necessary for her colleagues to understand and overcome skepticism regarding such a radical new technology. Specifically, of her colleagues she said, "they were much less willing to even want to know more about it than I was, which suggests that because of some skepticism regarding whether or not technology [in general] can replicate sufficiently well the human interaction process and human thinking process." She mentioned a demonstration as perhaps a useful device to this end.

Additionally, U2 stated she uses the Socratic question-answer method for teaching, and as such she found DocuScope of little use as a classroom tool. We can infer that demonstrations of the tool's usefulness in the classroom – perhaps including lesson plans, to make usage of the tool easy – would help illustrate the tool's value.

5. ***The DocuScope layout is largely unsuccessful, but color-coding of genres is excellent.***

U1 and U2 both had problems with the visual presentation of the current prototype. In U1's case, he stated, "This is a challenge to read … I'm looking through my bifocals and I still can't read it." As potential users of the tool will likely be of a wide age range, increasing legibility (especially via text size and layout) would be a good idea.

U2's contribution to the presentation issue was subtler. When presented with a screenshot of the DocuScope STV view, she immediately understood the significance of the color-coding of classification criteria. This technique was implicitly accepted by a potential user, and so should be maintained for the immediate future.

6. ***Business communication users want clearly defined support for iterative self-evaluation.***

Professional writing is, according to U2, structured and goal-oriented. Formulaic writing exists and is very well entrenched in lesson plans and teaching approaches. This entrenchment must be known, and finding ways to support this process as opposed to attempting to change it will lower the barriers to entry.

For the business communication audience, U2 believes DocuScope is of most immediate use as an evaluative tool for students while they work on examples of specific genre types because it can "enable writers to begin to evaluate their own writing and see sort

of how it compares to other people doing essentially the same kind of writing. So it's a way to test out your first draft or early drafts against others who are doing the same sort of assignment and get some feedback and presumably do some sort of revision on your own independently with not having to have somebody grade it and give it back to you." Position DocuScope accordingly – self-evaluation for students is a need uncovered by U2 that the tool can likely already support. Such support would be consistent with U2's mentioned goal-oriented approach to the business-writing process, as it would allow students to measure their proximity to the target genre.

7. ***The current DocuScope dictionary is not appropriate for all audiences*.**
   According to U2, DocuScope's current dictionary "has some limitations when it comes to business writing … [it] does not always work well as an analytic tool for business writing." She mentioned that incorrect encodings are made because the semantics and usage of a word is different in business communication. Multiple dictionaries corresponding to different types of communications analysis are necessary if the tool is to be useful.

In addition to the interpretations stated above, a few notes should be made regarding the successes and failures of the various techniques employed by this group while collecting data. Consider these our 'lessons learned'.

- *Try to schedule with more users than you think you will need.* A simple restatement of Murphy's Law, we found that contacting and scheduling interviews with busy subjects can be difficult. It would make sense to gather more subjects than really necessary in order to accommodate changes in plans.

- *If necessary, customize interviews for each subject.* This is especially true if subjects are diverse. Ensure that the interviewer understands appropriate background and domain knowledge relating to the subject's particular expertise, and tailor the questions to be asked to the subject's particular strengths.

- *Test any demonstrations to be made beforehand.* Especially when running resource-intensive applications on older laptops.

- *Ask very specific questions on questionnaires.* General demographics information can be useful, but questions that are *too* general usually aren't as useful.

Role-playing worked well in concert with an artifact walkthrough. This is especially true when all stakeholders involved in an artifact's use aren't present. For example, the interviewer said to U2, "Pretend I'm a student of yours. Can you look at this cover letter and give me some feedback?" U2 addressed the interviewer as if he were the student, and this resulted in more honest feedback than would probably have been given were U2 speaking in the third-person of the student.

Conclusion

This user study makes the following list of conclusions to guide the DocuScope project:

1. **Serve two primary audiences**
2. **Treat both audiences as skeptics**
3. **Prove DocuScope's value through demonstration**
4. **Explain to the user how to use DocuScope**
5. **Re-name the DocuScope categories**

1. Serve two primary audiences

Our study revealed two principal audiences, each who has a separate set of needs to accommodate.

Both the student and the writing teacher might be interested in using DocuScope. Students may want to use to tool to improve their writing. Teachers may want to use the tool to help their students write better. But both these groups will probably not be interested in science or linguistic research behind the function of the tool.
The academic researcher, on the other hand, wants to derive a different set of benefits. More vested in the field, they will want to understand both the theory behind DocuScope, and how that theory is able to separate and more deeply understand genres.

Because these two audiences have different sets of primary needs, they ought to be treated differently.

2. Treat both audiences as skeptics

While many of our users had previous personal knowledge of DocuScope, they reported skepticism from their peers. We can expect to see a similar pattern in less familiar users. Specifically, they reported skepticism over whether any technology tool could emulate the human thought process of decoding language.

While it is doubtful that any informational website might dissuade users who have such fear that technology will replace them, there is a more limited but important fact that should be interpreted from this situation:

The inherent value of DocuScope is not a given. The burden of responsibility rests squarely on the shoulders of the DocuScope project to prove its value.

3. Prove DocuScope's value through demonstration

This will undoubtedly be the trickiest part of the experience, and where you will win and lose you audience. They will see the benefits and understand. Or they will not, and they will perceive the entire surrounding website as hype.

4. Explain to the user how to use DocuScope

Imagine the project is successful enough to stimulate interest. Now what? Our users reported generally low experience with text analysis tools. It will be important not only to provide tangible proof that DocuScope provides a benefit, but exactly **how** users might derive that benefit for themselves.

The power of DocuScope lies in its ability to classify language, enabling users to characterize a passage or passages. So the validity of its ability depends significantly on how users interpret the meaning and validity of categories.

5. Re-name the DocuScope categories

All users were unsure about the meaning of the categories -- unsure of the logic behind the linguistic hierarchy, the significance of their difference, or simply the meaning of the words both in and out of the context of text analysis -- but we observed almost universal confusion.

Recommendations

The challenging part that remains is how to accomplish the goals stated in the conclusions. Given the list of stated objectives, this study makes the following design and website implementation recommendations:

1. **Create Two High-Level Flows**
2. **Better or Re-Define the DocuScope Categories**
3. **Create Two Versions of the Product**
4. **Provide Two Levels of Demonstration**
5. **Address Two Levels of Information Needs**

1. Create Two High-Level Flows

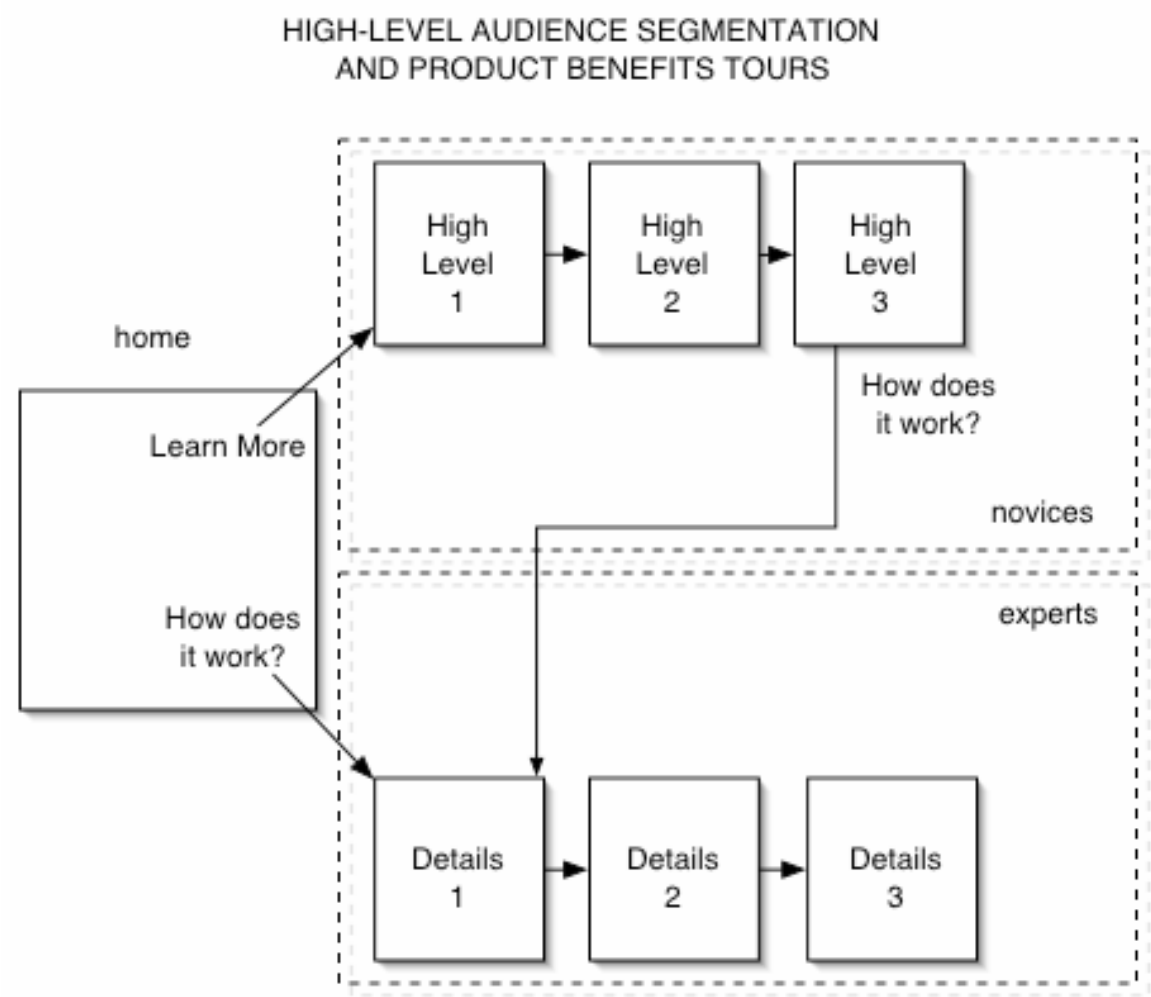
Our research shows we can classify the various audiences horizontally based on experience levels and pre-existing level of commitment/curiosity to the field and the product.

Because these two groups will require such vastly different kinds of information presented in significantly different ways, we recommend that the web site segment these audiences into two groups -- **novices**, and **power users**.

Next, given the impatient nature of web-based information searching, all users should get a high-level summary of the project expressed in terms of **tangible benefits** the product can provide for their lives. This quick tour will need to be a high-level summary with tight quippy copy that speaks in **plain non-technical or rhetorical language**. The website should drive all users though this primary system.

The website should also meet the more sophisticated needs of power users by creating a separate information system for their more highly-evolved and technical information needs.

These two goals might be synthesized by providing a high-level synopsis of the product, and then allowing for the two audiences to segment themselves.



2. Better or Re-Define the DocuScope Categories

The key to understanding the benefits of DocuScope is its linguistic categories. Without understanding the DocuScope analytic categories, users cannot derive any useful information from using the DocuScope tool. All users must be provided with an **immediate and clear understanding of what the categories are, and how to use them** to interpret texts using the tool.

In its current state, users **universally** reported difficulties understanding the classification system. Therefore, **it is imperative that the categories be properly explained, or modified** so that they are more immediately intelligible to all classes of users.

Specific Feedback Concerning the DocuScope Categories

Category	*Observation*
Inner Thought	"it's not clear whether it's demonstrating the writer's inner thought or anybody's inner thought"
Inner Thinking	"Inner thinking as a dimension of inner thinking is not very clear"
Think Positive	"Positive and negative are fine."
Think Negative	"Positive and negative are fine."
Think Ahead	"Think Ahead is fine."
Think Back	"I would have no particular problem with [think back]."
Relations	"to me it would mean relations between … writer and reader … but then I have difficulty with some of the specific terms under that."
Reasoning	"why reasoning falls under relations I'm not sure."
Shared Social Ties	"shared social ties means something to me … a we're in this together kind of."
Direct Activities	"direct activity doesn't tell me very much."
Interacting	"I don't know how interacting differs from relations .. I don't know what kinds of words I expect to see"
Linear Guidance	"linear guidance is one I've never understood."
Description	"in general the descriptive part I don't have much problem with."

3. Create Two Versions of the Product

The next challenge is to determine what to do with all the information DocuScope provides.

For novice users this presents a particular challenge. Novice users will want to understand how to bring DocuScope into their lives, but will not be comfortable investing time learning a new tool -- even if that tool might provide significant benefits to them. **DocuScope will be more likely to gain a foothold to helping those users by working within the confines of their needs.**

But to power users, DocuScope's rich features are what will define its success. More likely to commit time to learning a new technology and

more able to grasp the rich information the tool can provide, these users will benefit from access to every feature that DocuScope can provide.

To be successful with both user groups, DocuScope should speak to them with different faces -- and **create two versions of the product, one for novices, and one for power users**. This translates into an expert version for researchers, and a more streamlined version for students and teachers.

Expert Version

The current version of DocuScope qualifies to a large extent as an expert version. The tool provides great insight for users looking to truly and deeply understand how certain language characteristics define various genres.

To get that level of understanding from the tool, expert users actually *require* the large quantities of detailed information the current interface provides. They will thrive on the rich data provided by the multiple views. They will be more comfortable distinguishing significant data from noise.

If the tool proves successful, and expert users actually adopt it as part of their standard rhetorical practices, expert users will need to store the DocuScope output in a form that can be incorporated into their research documents. It would be useful to consider exporting the graphic representations and statistics in a graphical form more capable of import into PowerPoint presentations.

Novice version

Novices report information overload from the product. This sentiment interferes with their ability to receive any real benefits from the product. The solution is to **limit the amount of information that is presented** to them.

A novice version might start users at a high-level summary screen. This screen could turn the DocuScope report into a single histogram, measuring distribution across the categories. That information may be enough to get users curious to explore further, and dig deeper into the meaning of the distribution. Then, it would be appropriate to provide the kind of information

But by emphasizing the simple output in a single easy-to-interpret screen, DocuScope could provide much of its current benefit to the novice user without asking them to explore further or sift through the rich amount of data it provides.

The key to the novice version will be to hide much of DocuScope's technological capabilities -- or make them voluntary to explore -- so that the product's most relevant qualities shine through.

Let these salient benefits prove the value of the product to the user. If curious, **the user is always free to explore the expert version of the product.** But with this method, they are not obliged to.

4. Provide Two Levels of Demonstration

Both user groups will need a compelling demonstration of the product benefits at both levels of functionality.

Demonstration for Novices

Novice users will require a high-level description of how the product benefits them. **It would be a mistake to assume the novice user has any experience using technology to learn**, especially with language, which is traditionally taught with such a different, more methodical and grammar-level approach. So it would be useful to provide them with a means to integrate DocuScope into their academic experience.

This might be accomplished by **guiding the user through a single use of DocuScope to analyze text they will already be familiar with**. This kind of guided demo will not leave to chance that the user will stumble upon DocuScope's benefits, or be able to individually interpret them. Instead, it will very deliberately reveal the kinds of distinctive use of language that the product is so capable of revealing.

> e.g.
> Walking through Martin Luther King's "I have a dream" speech and citing the abundance of (what is currently called) "think ahead." It might also be useful to compare/contrast this text with another, more introspective piece.

It would also be useful to **show the novice user how to apply DocuScope to their own individual studies**, which is also a leap that

would be unwise to assume they will be comfortable making without guidance.

This might be accomplished by providing a sample writing assignment. The user can then be shown the feedback DocuScope provides, and how to analyze, interpret, and incorporate this into their experience of writing.

Of course, it is also important here to include that DocuScope should not be used for the purposes of evaluation. But instead, it will be very helpful to show a user, in the imagined context of a lesson, how a writing sample can be improved

> *e.g.*
> The task is to write a cover letter. The writer is not on familiar terms with the reader. DocuScope might be able to provide feedback that the first draft was heavier on (what is now called) "inner thinking" or "shared social ties," which might not be appropriate given the expository circumstances.

Demonstration for Experts

While we have observed power users to be more capable of advanced-level understanding of the product, we should not assume they will be more disposed to believe the product is more credible than novice users. **They will still need the benefits of the tool proven to them. But we can accomplish this task with a higher level of detail**.

Power users will benefit from a demonstration of the high-level benefits of text analysis. It would be helpful to walk them through well known rhetorical categories. But rather than explaining how DocuScope reveals how "we use language," it can explain how DocuScope "strings separate the distinctive language inherent in various genres."

Power users will also appreciate the rich information multi-text view can provide.

5. Address Two Levels of Information Needs

Website messaging

Commit significant real estate to explaining where the DocuScope categories come from, what they mean, how they contribute to the

value the system provides, and why they were chosen (opposed to any other labeling system).

Help system

In its current state, the product does not contain a help system. But to succeed, it will need to contain detailed instructions targeted to each user category we have identified.

Novice users will need a more detailed instructions at the button-and-menu-level. They will need to understand how to import a single text, or multiple texts. They will need to know what to do when they get confused. Expert users will need instructions to address a high level of use.

Relationship system

It would be a good idea to establish a relationship with these expert users, through some form of subscription. This group will probably be aware of trends in research, so perhaps some kind of push-newsletter might create an opportunity for regular contact.