ABSTRACT

Users of help systems often complain that the documentation is pitched at the wrong level, but the “right” level differs among users. Building on a prior definition of the space of possible expressions of documentation in terms of task, application, and user experience, we explore what it means to express help at different levels. We also survey other dimensions in which help contents may be organized to provide ease of access to the information people need when troubleshooting applications, and conclude by proposing an interface through which users could navigate dynamically, thus finding help expressed at their own “right” level.

Categories and Subject Descriptors
H.5.2 [Information Interfaces and Presentation]: User Interfaces – Evaluation/methodology, training, help, and documentation.

General Terms
Human Factors, Measurement

Keywords
Adaptive help, help systems, documentation, multi-layer interface, online help, graphical user interface

1. INTRODUCTION

When faced with problems in using computer applications, people typically resort to trial-and-error methods rather than use the application’s help system [11]. When asked what they want in computer documentation, users’ top concerns are navigation and appropriateness of explanation [10].

Help systems are often tuned to a level of technical detail that does not match the level of experience of users, who find the explanations in online help to be either too complex or too basic to address their questions adequately [9]. But precisely because users vary in their needs in incompatible ways, it is unlikely that any particular version of a help system could meet the needs of most users. And it remains unclear how to produce documentation that adequately targets the levels of expertise that users say they want. This issue could potentially be solved through the design and development of an interface that enables users to tune the level of technical explanation to suit their level of experience, which requires help to be written into multiple levels with respect to a specific set of dimensions.

The main objective of this paper, then, is to explore kinds of levels of help and what it would mean to express documentation in different points in the space defined by multiple dimensions of help. To address this problem, we review work related to the design of multi-layer and multi-dimensional interfaces, build on previous models of help for different levels of experience by formalizing a multi-level model, and develop examples of rewriting help for multiple levels. We conclude with a proof-of-concept design for a user-controlled dynamic multi-dimensional help system and a discussion of the issues raised by our approach.

2. MULTI-LAYER AND MULTI-DIMENSIONAL INTERFACES

Multi-layer and multi-dimensional interface designs have been proposed for user-interface applications, particularly to address changes in usability requirements as users gain experience. Review of the literature indicates that this approach has not yet been applied to help systems, which appear to be particularly vulnerable to mismatches between user and system in their respective levels of expertise [9], [10].

Multi-layer interfaces display content organized in different layers that vary across increasing levels of complexity relative to user experience. This kind of design enables users to learn in a structured sequence while limiting feature complexity [12]. This approach has been called a “training wheels” interface (see, e.g., [1]).

An example of such an interface is Shneiderman’s multi-layer interface for a text editor, which features a slider bar that moves through eight layers of feature complexity [13]. As seen in Figure 1a, the interface displayed a limited set of features at the first layer, offering only basic editing functions to novice users of the application. In Figure 1b, the interface changed as the slider bar is moved to the third layer, displaying more features and grouping previous features into submenus. Each layer in the interface presented features grouped into categories of increasing complexity such as basic functions, editing, formatting, structures (e.g., tables and frames), and document styles [13].
Shneiderman also suggested that layers may be grouped by usage patterns, task complexity, or according to the topic structure of training textbooks.

Another example of a multi-layer interface displays a step-by-step tutorial on how to build an electrical circuit [14]. The interface reveals additional information about the current flow in the circuit at each step in the tutorial. The interface is shown in Figure 2.

The multi-layer tutorial does not display varying levels of complexity like the multi-layer text editor, but a careful analysis of the layered information displayed in the tutorial shows that additional information is introduced to address common user questions identified by Kearsley [6] such as “How can I do this?”, “What happened?”, and “How should I respond?”. Some of this information is already available in online help, but additional work is needed to provide answers at each level of user experience.

A different kind of interface, a multi-dimensional interface, was proposed by Novick [8], who organized different aspects of a flight crew operating manual into three dimensions:

- **Why**: purpose of a procedure (the procedure’s goals).
- **What**: what to do (the procedure’s acts).
- **How**: how to carry out a procedure (the procedure’s actions).

These dimensions, corresponding to the stages of the Gulf of Execution in Norman’s model of the user-interface action cycle [7], are displayed in the interface, and can be toggled on or off by using check boxes to select which aspects to show or hide. The interface is displayed in Figure 3.

The why-what-how dimensions provided a model that may improve navigation in help by organizing its contents into selectable modules whose contents are categorized similar to the manual presented by Novick. Also, as we will show in Section 4, these dimensions vary across multiple levels.

The multi-layer and multi-dimensional interfaces presented examples of models that have been applied to computer applications and which could be applied to the design of online help by separating help content into different dimensions and varying the content across multiple layers relative to complexity levels. Even if a set of dimensions could be defined, though, the difficulty lies in categorizing the help content into layers at the “right” level of help for users with varying degrees of experience.

### 3. THE TASK-APPLICATION-USER (TAU) MODEL

Rewriting help across levels raises the question of the dimensions across which help should vary. Previous studies [9], [10] showed disagreement among users as to which dimensions
in help should be at the “right” level. Our current research explores these issues by formulating Kearsley’s [6] model of help dimensions. Kearsley identified three important dimensions for help systems: the user’s task experience, program experience, and computer experience:

- **Task experience** describes the user’s experience regarding the particular task or set of tasks for which an application or group of applications were designed. Namely, a person may be an expert in statistical analysis, but does not know how to use the statistical formulas in Microsoft Excel.
- **Application experience** denotes the user’s level of experience with respect to a particular program.
- **User experience** refers to the user’s general experience using computers and other applications.

We express Kearsley’s dimensions as a function called TAU (abbreviated as τ) for task, application, and user. Thus τ(t,a,u) represents the level of experience of a user with respect to each dimension. Following Kearsley, and Covi and Ackerman’s [2] adaptation of the model, different values of the τ parameters situate a particular user in a three-dimensional space possible expression of help, as depicted in Figure 4.

![Figure 4. The TAU dimensions.](image)

In our simple initial model of the τ dimensions, we use the following level ratings for users: 1 for novice, 2 for intermediate, and 3 for expert. We have yet to determine if we could vary the contents of help across additional levels, and this remains an active research issue.

4. **Rewriting Help for Different TAU Levels**

We now turn to the main contribution of our work, in which we examine what it would mean to vary explanations in help systems for different levels of user experience.

Implementing a help system in a multi-layer interface involves adapting the contents of the help system across the τ dimensions of experience. Given the τ model, though, it was not clear that this could be accomplished in practice. Our challenge involved choosing which contents corresponded to each of the why-what-how and τ dimensions, and how these contents could vary across multiple levels of experience. If this were done appropriately, the organization and presentation of help across multiple dimensions and levels of experience could enable users to find the information and use they needed to perform a task with a computer application. This mapping proved to be non-obvious. Moreover, as noted earlier, it remains unclear if the why-what-how dimensions are actually distinct from the τ dimensions.

To explore this issue, we rewrote parts of the contents of an existing commercial help system to adapt them across multiple levels. Our work involved determining which parts of the help topic corresponded to the why-what-how dimensions, and whether we could produce coherent variations of a help topic for novice, intermediate, and expert users. This involved providing τ levels for each topic and its contents.

For this study, we developed multiple versions of parts of the help system for Microsoft Excel, where these versions corresponded to combinations of different parameters for τ. In choosing Excel, we sought an application for which we could reasonably expect to find populations of users who varied significantly across the τ dimensions. In contrast, in a related study [12], we needed subjects who had little or no experience with a particular computer application, and for that experiment we used Microsoft Publisher. As we plan to test the τ model as embodied in a user-settable help system, we are interested in having variable levels of experience. Other studies suggest that levels of experience with Microsoft Excel vary robustly among users [9], [11], so this application should have future study participants who can represent all levels of experience.

To develop examples of help expressed with different combinations of τ parameters, we rewrote Excel’s help topic on copying and pasting multiple items across Microsoft Office applications using the clipboard, and produced three different versions of this topic: τ(t,1,1), τ(t,2,2), and τ(t,3,3). While we have yet to assign absolute values to the τ dimensions for particular topics, we were able to rewrite three help topics that can be rated with respect to each other. That is, some features seem less advanced than others. For example, *copy and paste* appears to be less advanced than *copying and pasting multiple items across programs using the Microsoft Office clipboard*. The help topics by themselves, in the absence of a specific task, proved unsuitable for rating in the task dimension.

As we analyzed the three Excel 2003 help topics, we found that the why-what-how dimensions were not clearly identifiable. Thus we had to write some additional contents for these topics, especially the what component. Interestingly, similar content was added in Excel 2007 help.

The main issue with both versions of Excel help is that all help topics contained mixed levels of explanation because technical terms, icons, and other explanations for each feature were included in the same paragraph or even within the same sentence. A partial example is shown in Figure 5.

![Figure 5. Explanations for all levels of experience in the same sentence.](image)

We rewrote the *copy and paste* topic for each level. The τ(t,1,1) explanation of the topic in Figure 6, aimed at novice computer users who are new to Excel, uses simple vocabulary and visual guidance on how to carry out each step,
along with an explanation for what the feature is, why use it, and how to use it.

A τ(t,2,2) explanation of the topic, aimed at intermediate users of computers who have intermediate experience with Excel, still reminds users what the clipboard is, but omits pictures and assumes the user knows how to find the menus that are outlined in the topic. This version of the topic is shown in Figure 7.

Finally, the τ(t,3,3) expert-level explanation does not use any graphical guidance, uses more technical terms, and even suggests keyboard shortcuts so that users can copy and paste more fluently. This version of the topic is shown in Figure 8.

These different levels of experience vary only with respect to application and user experience together. We have yet to determine how to vary help by task or, more interestingly, in other τ combinations such as τ(1,3,2) or τ(3,1,2). If these further combinations prove to add little benefit or to be impractical, this would suggest that the τ model could be simplified by reducing the number of dimensions.

5. CONCLUSION

This paper presented a survey of dimensions in which online help can be modularized to improve its navigability, some of which address “level” mismatch between users and help by lending themselves to variation across multiple levels of user experience. The τ model described a set of dimensions in which we were able to vary help relative to the why-what-how dimensions in which we categorized its contents. Our goal was to vary the level of explanation in help to provide a suitable representation for users with different skill levels.

The τ model can be embodied in a help system for a particular application. Figure 9 shows a design concept for such a help system, which combines both the multi-layer and the multi-dimensional designs. Each τ level represents one layer for each help topic, and users can customize the level of explanation in each help topic by moving the slider bar to the right to increase the level of explanation or to the left to decrease the level of explanation.
The main contents in the display are categorized in the why-what-how dimensions, which can be toggled on or off with the exception of the how dimension, which is always displayed by default. Such contents will vary along different levels as the slider bars are moved sideways by users. Whether the why-what-how dimensions can be expressed in the $\tau$ dimensions is another open research topic.

The proposed design for a help system incorporates a multi-layer, multi-dimensional interface through which the user can dynamically specify how the documentation can be presented at different levels. Our design concept provides check boxes through which the user can select which parts of a help system to view and three slider bars through which the user can change the level of the displayed content.

Many researchers have addressed issues of adaptive help (see, e.g., [4], [1]; a full discussion is beyond the scope of this paper), but they focused on automatically adapting the content of help systems through artificial intelligence techniques. Our work differs from this line of research in three key ways, in that it:

1. Focuses on enabling the user to set appropriate levels of explanation her- or himself, rather than trying to build a dynamic mental model of the user through artificial intelligence.
2. Involves choices of presentation as well as of content.
3. Explores in practical terms what it means to produce written documentation at different levels of multiple dimensions of user expertise.

This interface for help systems represents a potential solution to users’ common complaint that help is at the “wrong level.” Dynamic, user-settable levels could enable users to customize the level of explanation through slider bars in a multi-layer, multi-dimensional interface. Our exploration of producing help at different levels suggests that doing so is possible but that general rules remain unknown.

Given that our conceptual design in Figure 9 presents what we see as a reasonably intuitive interface (modulo the why-what-how dimensions as separate choices), and given that we were able to develop versions of help topics for Excel that illustrated points in the space defined by $\tau$, it may be possible to develop an interface for help that enables users to find their right level of help by adjusting the sliders for the $\tau$ dimensions.

Accordingly, we see our future work as addressing the following issues:

- Understanding how users’ $\tau$ levels translate into more useful help. We plan to ask users to rate help by identifying which parts of help are at right and wrong levels of explanation for them and explain why.
- Rating and tagging additional help topics according to each of the $\tau$ dimensions and levels. This includes determining which contents of help are related to the task dimension.
- Deciding how many levels of experience should be used to organize help. For the moment, we have three levels, but perhaps we can produce variations of help contents between the novice, intermediate, and expert levels.
- Understanding whether the why-what-how dimensions can be expressed in the $\tau$ dimensions.
- Determining whether users are, in practice, able to use controls like those in the interface in Figure 9 to tune help to reflect the levels of help they need.
- Looking into additional models that may be compatible with $\tau$, or which can accommodate other dimensions to provide a more usable representation of online help.

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7. REFERENCES


