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## **Why people can't use eLearning**

**What the eLearning sector needs to learn about usability**

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## 1 Introduction

Unusable interfaces will cost eLearning companies billions of dollars in lost revenues because many people won't be able to use their products.

The US eLearning market has a projected value of \$11.5 billion by 2003 [1] while the European market is expected to be worth \$4 billion by 2004 [2]. However, poor usability will contribute to disappointing results for many eLearning companies, for the following reasons:

- Failure to create lasting competitive advantage in a crowded and competitive marketplace.
- Failure to develop ongoing customer loyalty. Despite the trend towards lifelong learning people will be reluctant to continually return to services which they find difficult to use.
- Exclusion of a major user group. In the USA, 8% of the US population has visual, learning, cognitive, auditory or physical dexterity disabilities severe enough to affect their ability to access the web [3]. In Europe, the figure is 11% and is expected to reach 18% by 2020 [4]. These people control \$175 billion in discretionary income [5].
- Difficulty in supplying government agencies and public bodies worldwide. Companies who do not provide interfaces which are accessible to people with impairments or disabilities will be unable to sell to this market. Relevant legislation is already in place in the US [6] and the UK [7].
- Potential risk of legal actions, similar to those taken against the organisers of the Sydney Olympics [8] and AOL [9] because they did not provide accessible interfaces.

This paper discusses how eLearning can deploy practical usability techniques in interface design to help overcome these issues. Usability is all about making software, websites and online applications or services easy for everyone to use, including people with visual, motor, cognitive or hearing impairments.

This paper will provide eLearning developers with:

- Practical examples of usability problems with some eLearning products
- A discussion of important usability considerations for eLearning
- Guidelines on avoiding these problems
- Useful resources on usability and accessibility

### 1.1 About the Authors

Frontend delivers innovative, user-friendly interface solutions that put the user first. We build interfaces that deliver significant benefits to business, both in terms of effective solutions and time/cost savings in development. Frontend has provided usability and accessibility consultancy and interface design services to Government agencies, eCommerce and eLearning companies.

## 2 The current state of usability in eLearning

To gain a deeper understanding of the current state of usability in eLearning, we carried out a simple usability analysis of three products. We created a scenario in which people who were representative of real users had to try out a demo version of an online course. This is something that real users would do in real life before they commit their time or money to the full course.

The products we analysed were:

- An Electronic Companion to Operational Management, from Learn2.com
- Flash 5 Self Study Course for Windows, from Macromedia & Element K
- Microsoft Windows 2000 New Features, from NETg

Our aims in carrying out this analysis were:

- To identify the type of usability problems that eLearning users encounter.
- To learn from the mistakes which were made.

This analysis is not intended as a criticism of the efforts made by people who are responsible for the applications we reviewed. Also, it should be noted that some of the features discussed may have changed since the time we reviewed them. However, we still find it useful to discuss these features, in order to give an overview of current practice. Our analysis does not constitute an exhaustive evaluation.

### 2.1 Summary of findings

We found that some serious usability problems were common, including;

- Counter-intuitive reading order of on-screen material.
- Failure to relate to the real-world experience of the user.
- Poor presentation of key information.
- Lack of accessibility, even in the most basic sense.

What follows is a short discussion of some usability issues we encountered with each application. To show how poor interface design can exaggerate usability problems for people with different kinds of impairments, we also looked at some specific issues which would make the applications difficult to use if they *had* been accessible.

### 2.2 Analysis: An Electronic Companion to Operational Management

This course is produced by Learn2.com [10]. Our user test found the following usability problems.

**Counter-intuitive reading order and layout of screens** (see figure 1): One test participant said,

“It took me a while to realise that I had to read the right-hand text first, then the diagram or whatever on the left.”

The screenshot shows a web application window titled "Demo" with the subtitle "An Electronic Companion to Operations Management TM". The main content area features a TOWS matrix and explanatory text. The matrix is a 2x2 grid with "Opportunities" and "Threats" as columns, and "Strengths" and "Weaknesses" as rows. The text in the matrix is as follows:

	Opportunities	Threats
Strengths	Choose strategies that match opportunities with strengths. <b>This is where you want to be!</b>	Choose strategies that avoid threats but exploit your strengths.
Weaknesses	Choose strategies that exploit opportunities, but remember your weaknesses. Create long-term strategies to overcome weaknesses.	Avoid strategies that put you here!

Red arrows point from a callout bubble "Where are we in the SPP?" to the top of the matrix, from the top-left cell to the text "This is where you want to be!", and from the bottom of the matrix to the label "TOWS Matrix".

To the right of the matrix, the text reads: "Concurrent with the environmental scan, planners should assist their thinking about strategy by doing an analysis referred to as TOWS: Threats Opportunities Weaknesses Strengths (Some textbooks use a different acronym, such as SWOT; the idea is the same.) Threats and opportunities are generally external to the company and are identified through the environmental scan. Weaknesses and strengths are internal and are identified through self-study."

At the bottom, there are navigation buttons: "Environmental Scans", "Mission/Vision", "TOWS Analysis", "Strategies", "Page 1 of 2", "Strategic Decisions", "Strategic Planning", "Topics", "Testing", and "Options".

Figure 1: Screenshot shows confusing reading order of Learn2.com's Electronic Companion to Operations Management.

**Inconsistent functioning of buttons and rollovers:** (see figure 2) It was difficult to identify key interactive elements and even harder to predict their behaviour. A test participant said,

"After a while I was rolling over everything because I couldn't tell what was what and I had the feeling that I was missing out on things."

Course information which is supplementary to the main content is sometimes accessed with mouse-overs. At other times the user has to click on something which either looks like a button or an abstract icon. This inconsistency makes it difficult to identify key controls and confidently predict their behaviour, and requires the user to concentrate on second-guessing the behaviour of the interface, as opposed to absorbing knowledge.

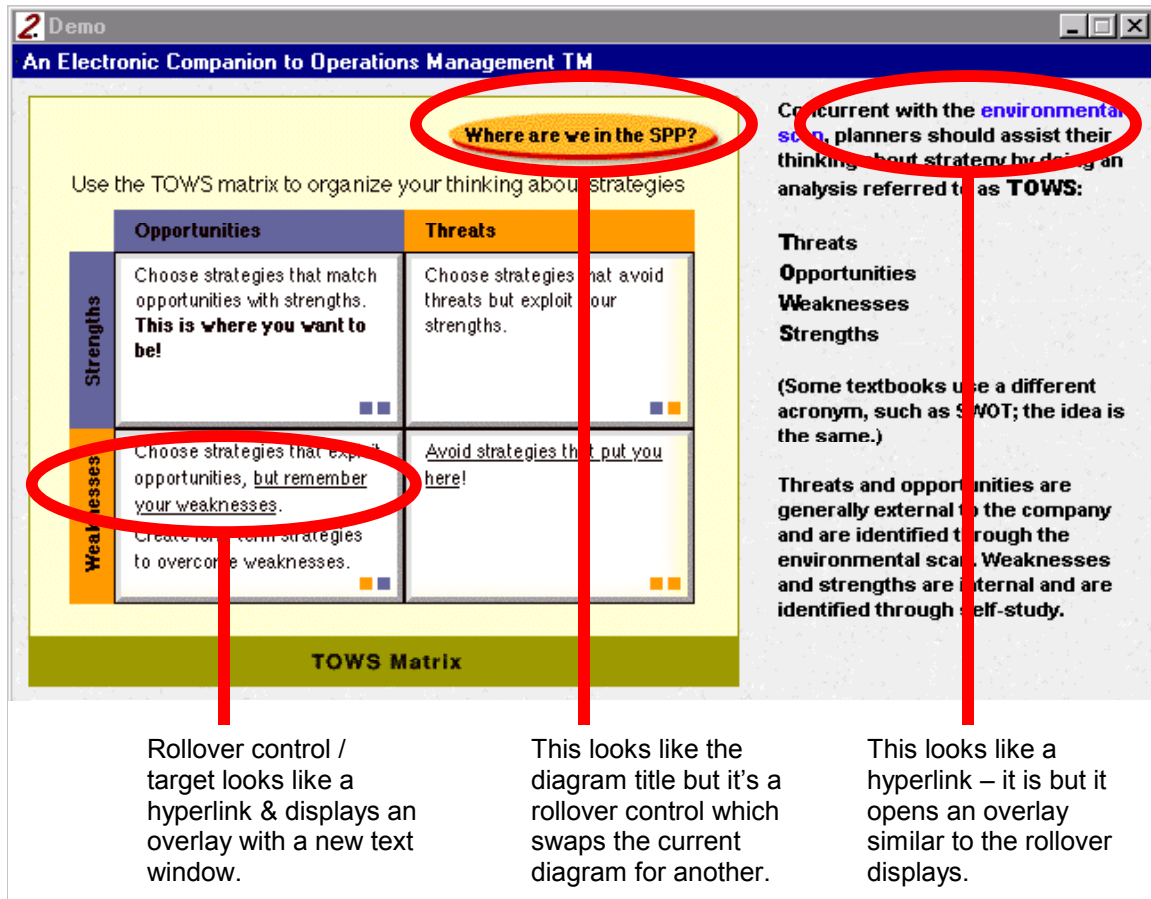


Figure 2: Screenshot shows that it was difficult to identify the function and behaviour of key controls in Learn2.com application.

### 2.3 Analysis: Flash 5 Self Study Course for Windows

Flash is a popular application which designers use to create animations, interactive web features and movies. The course is provided by Macromedia and ElementK [11]. Our user test found the following problems.

**Confusing presentation of learning simulation and application controls:** (see figure 3): This application runs inside it's own desktop window, which contains a simulated Flash window. A control panel for the application sits on top of the simulated Flash window. The control panel is the most prominent display feature and has a dark-blue border which is very similar to the colour and tone of a standard "active" window. The simulated Flash window also looks like an active window and to add to the confusion, the learning application window itself (which is *the* active window), displays the active window colour. Where should the user focus?

When one participant opened the application, they tried the simulated Flash controls and said, "This has just frozen".

The participant was annoyed because they couldn't move the control panel around the screen.

"I really want to move that blue box. I'd prefer to hide it or move it out of the way".

After the test, they added;

"I was concentrating on the blue box and not what was going on behind it".

**Failing to relate to real-world experience:** Flash is primarily used by visual designers and animators. Designers generally don't like obscuring the work area or function menus of the applications they use with floating menus, tool palettes or dialog boxes. However, the control panel for this application constantly does this. Failing to relate to the real-world experience of users detracts from the credibility of an application. People are reluctant to trust a learning source if they feel that it lacks credibility.

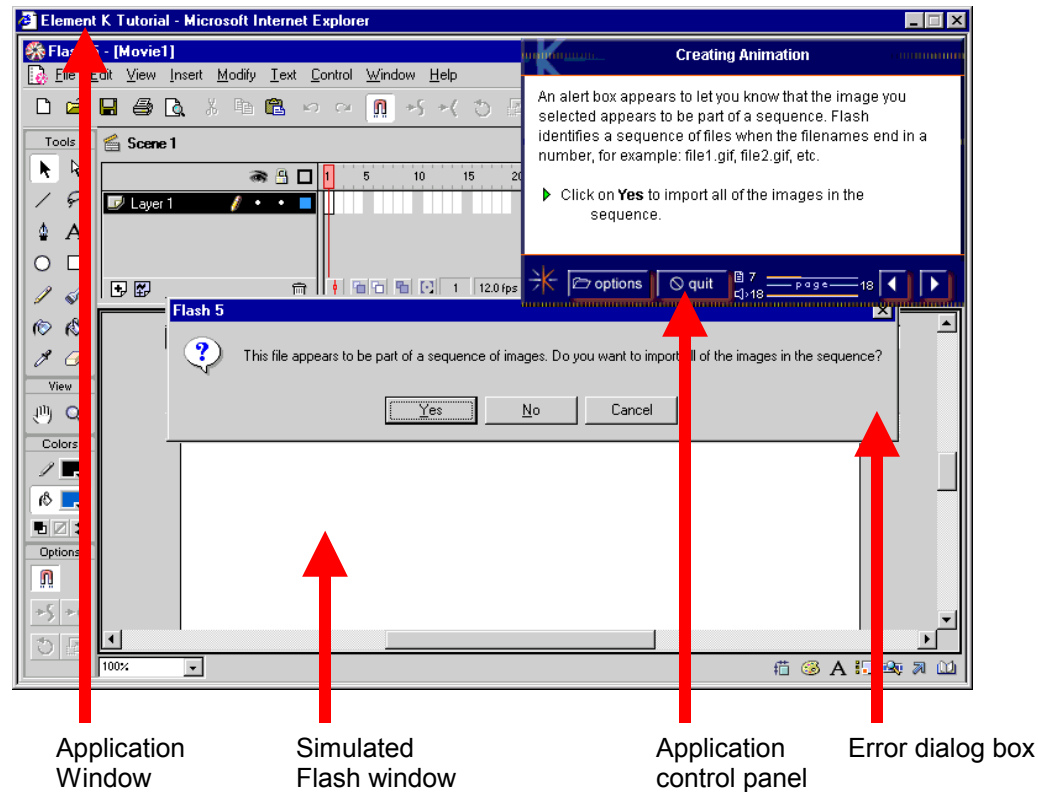


Figure 3: Screenshot of Flash 5 course shows the problem with focus.

**Keyboard-only control was impossible:** Keyboard-only control is important for people who may not use a mouse to interact with a computer. For example, someone with a motor impairment such as repetitive strain injury (RSI) or multiple sclerosis (MS) may use a special keyboard or may rely solely on a standard keyboard. If space is an issue, perhaps on a train or plane, the keyboard may be used to interact with the controls and interactive features normally associated with a mouse.

## 2.4 Analysis: Microsoft Windows 2000 New Features

This course is provided by Netg [12]. Our test uncovered the following issues.

**Comparison tasks were impossible:** Rollovers were used to provide definitions or explanations of key topics (see figure 4). A participant complained about this.

“I can't see the difference between things because the rollovers don't stay open when I move the mouse away”.

This means that users can't compare key concepts or relate them to each other in a meaningful way, which prevents them from gaining an overview of how these concepts can be applied in the real world.

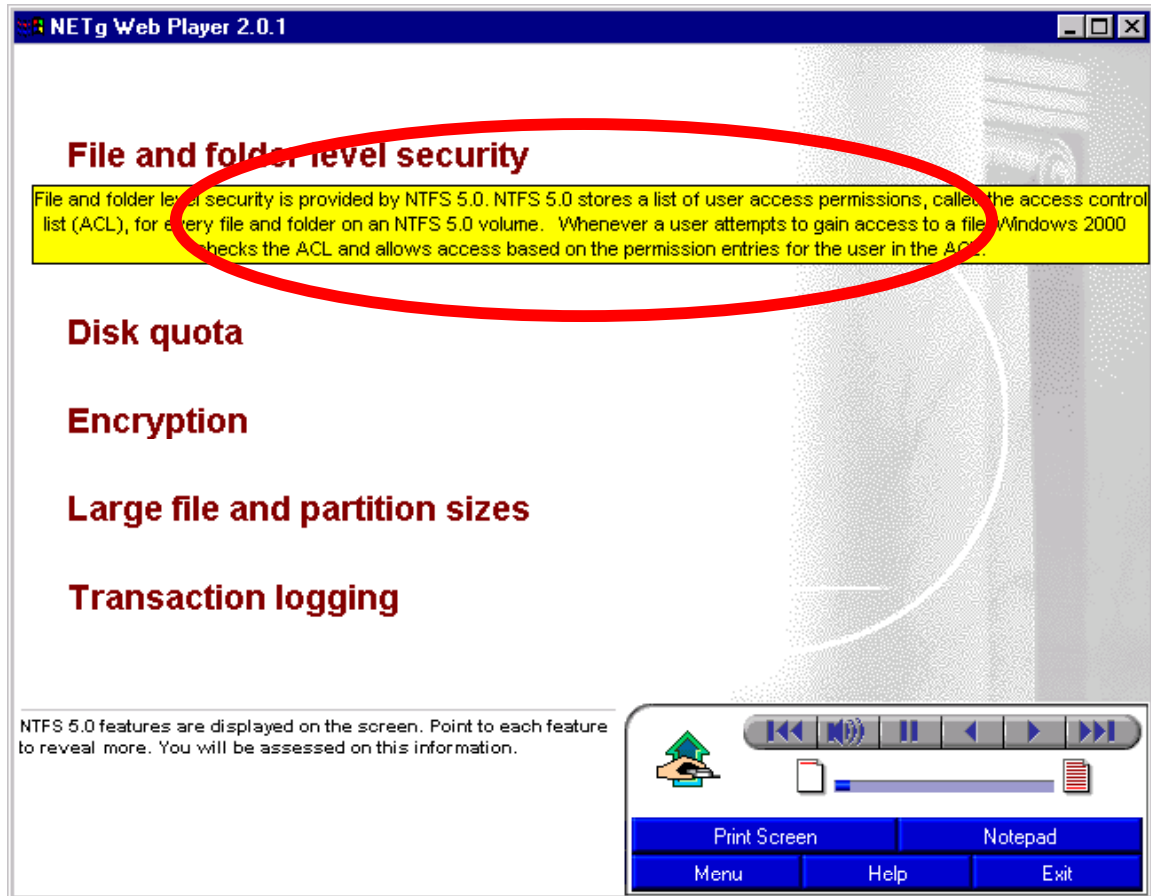


Figure 4: Screenshot shows inappropriate use of a roll-over feature on the NETg application.

**Fixed text size:** (see figure 5) This application provides the option to increase the size of the instruction text which appears in the bottom left of the window. Providing the flexibility to adjust the interface to meet varying user needs is good practice and re-sizing text is useful for people who are vision-impaired. However, the feature is only partly implemented - it does not control the text which appears in pop-up windows, or in the main content area.

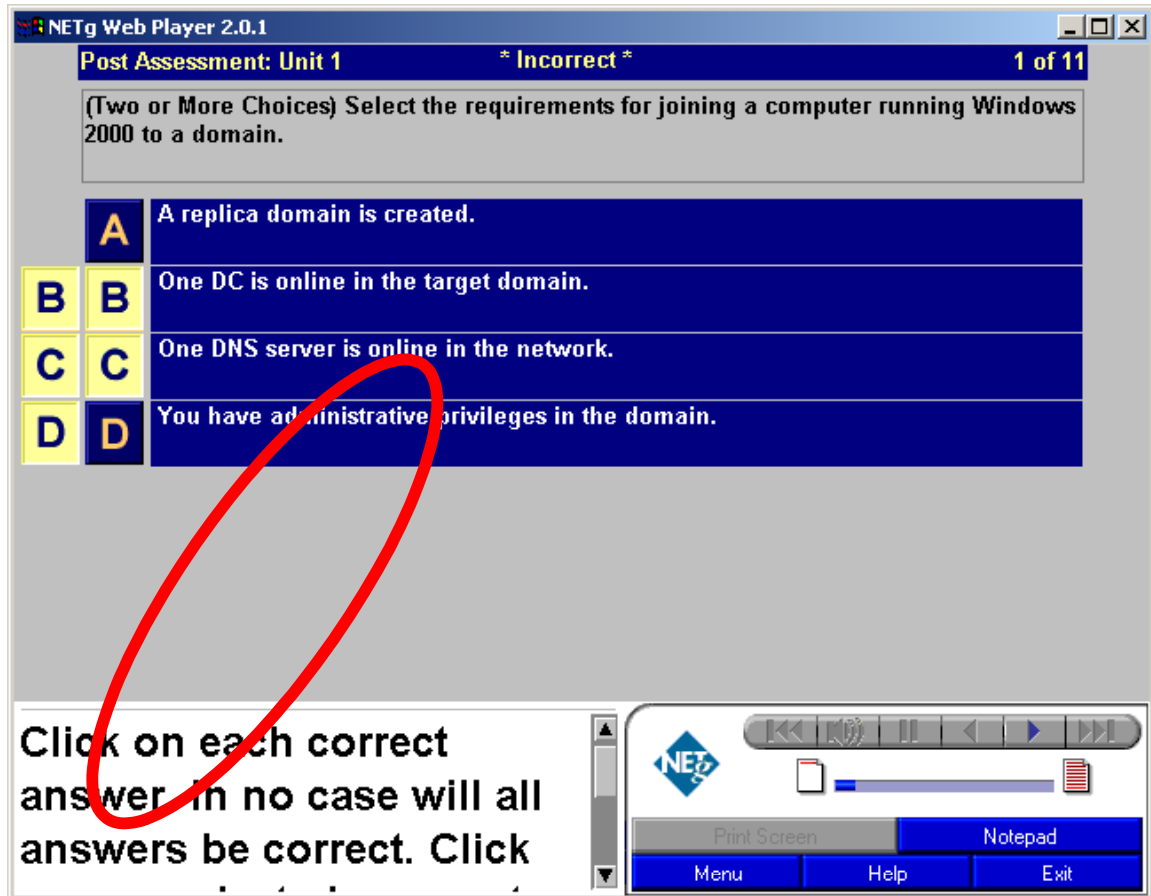


Figure 5: Screenshot of the NETg application shows problem with re-sizeable text.

## 2.5 Conclusion: eLearning has a lot to learn about usability

While we realise that the applications reviewed in our analysis are a tiny sample of what's currently on offer, we believe that eLearning interfaces have a long way to go before they are user-centric in a meaningful way.

To develop more user-centric interfaces and thus improve product quality, eLearning companies must adopt a usability strategy which involves keeping key usability considerations in mind, during product development.

## 3 eLearning issues and their effect on interface design

What follows is a short outline of some general usability issues which must be considered when developing eLearning interfaces.

**Motivation problems:** Figures on the dropout rates for online courses vary. Between 30-75% of students fail to complete eLearning courses [13], [14]. Poor usability will compound this attrition problem by causing frustration or creating unnecessary barriers to completing online courses. Usability can play a key role in creating a positive user experience.

People are much more likely to continually return to an eLearning application or service which they find useful, relevant and easy to use.

**Repeat sales and ongoing customer loyalty:** Repeat sales are vital to the success of any eLearning company. Education and training is now a lifelong activity for many professionals and customer loyalty is thus exceptionally important in the eLearning sector.

Online customers continually return to services which they find relevant and easy to use. While the initial purchase of an eLearning product is unlikely to be made by the people who actually use it - especially in larger organisations – repeat sales are unlikely if end-users are unable to use or gain benefit from learning programmes in the longer term.

Ongoing customer loyalty can only be created by giving customers easy to use interfaces which create a positive “user experience” and are thus enthusiastically adopted by the workforce. User-centred design plays a central role in doing exactly that.

**Internationalisation:** Interfaces must be flexible so that they can be adapted to suit the needs of diverse cultures. Internationalisation is an essential precursor to localisation. Ideally an internationalisation process will ensure that the structure of an interface can support alternative means of presenting content.

For many, localisation simply means translation, but an understanding of cultural issues other than language is important if the usability of the interface is to go beyond simply being “understandable” in the most basic linguistic sense. Interface must reflect an awareness of cultural sensitivities.

For example, figurative depictions may not be widely acceptable in more traditional Islamic cultures. This needs to be borne in mind when designing iconographies which might feature illustrations of animal or human shapes. Localisation may also involve designing for cultures who read left-to-right.

**Long transaction times:** eLearning “transactions” take anything from 10-30 minutes to complete. During this time, the user’s online task flow is likely to be interrupted by distractions or supporting tasks required to achieve the objective of the transaction.

Someone engaged in home study may have to contend with distractions, such as answering the doorbell or checking on their children. Supporting tasks as part of an assignment could include looking up a reference book, visiting a website, using a calculator.

It should be easy for the user to jump in and out of their learning “transaction” without losing track of where they were and what they have to do next.

**Relating learning simulations to real-world experiences:** Simulations are increasingly used as experience-based eLearning tools. Creating simulations requires an understanding of how online students experience their environment in order to teach them on those terms.

For example, selecting some cells in Microsoft Excel is the same task with the same end result, regardless of whether the user is working with a screen reader or a GUI interface. However, the presentation of this task as part of a simulation will be completely different - the GUI experience is visual, while the screen reader experience is verbal. The challenge is to present the same information as an experience which is relevant to either user.

**Device independence and usage contexts:** Desktop PC’s still play a central role in accessing the web but mobile phones, PDA’s, digital TV and gaming consoles are increasingly used as alternatives. Going forward, people will use eLearning on a wider variety of devices at home, at work or while on the move.

Device independence is still in its early stages, but moves to adopt wireless technologies for learning are under way. For example, the UK Government's state-run Internet Learning Project will deliver the national curriculum over the TV as well as the Web [15]. In the Netherlands, the University of Twente, which already offers a web based e-learning program, plans to deliver eLearning services over mobile phones [16].

In the USA, the Advanced Distributed Learning Initiative (ADL) says,

“We envision a future in which everyone will have an electronic personal learning associate. This device will be able to assemble learning or mentor

presentations on demand and in real time - any time, anywhere... The device will be portable, perhaps small enough to be carried in a shirt pocket.” [17]

A commuter might use a wireless device to utilise “downtime” while travelling between work and home to review notes, read email from their course mentor, or participate in an online class discussion. They will expect consistent interaction whether they are using a PDA on a train, a pc at work, or digital TV at home.

The look and feel of an interface may vary depending on the access device but the essential interaction and the overall experience should be consistent.

**Meeting the needs of diverse user groups:** It is important to identify key user groups and to develop interfaces which are flexible enough to support their needs.

First time users, or people who are not confident with computers will appreciate clear instructions and up front information, while more advanced users may prefer features like keyboard shortcuts, configuration tools or advanced functionality.

Consistently mapped keyboard short-cuts for commonly used tasks can also improve ease of use for people using screen readers, as well as providing more fluid interaction for the more advanced user.

**Up front information:** People need to know what will be required of them before they commit to a specific task. This could involve providing an overview at the beginning of a course module, telling users how many questions or steps there are in a particular exercise. Up-front information is especially important for people using screen readers, as they can't visually scan a screen to determine how many questions make up an exercise.

**Feedback:** Feedback is essential to reassure users that everything is working, and to help them recover from errors. Providing an animation during audio transcripts to inform users that the visual display has not frozen or “timed out” is an example of providing visual feedback for reassurance.

Error messages can relate to very specific tasks within larger task flows. For example, failing to provide a correctly formatted email address when filling out an online registration form.

Providing helpful, informative responses other than “right” or “wrong” is another type of feedback which helps with error recovery during interactive learning exercises.

**Reading large amounts of text:** Traditional learning has always relied heavily on reading large amounts of text. However, as a rule people do not like to read large amounts of text on a computer screen. Instead, they prefer to scan quickly through simple headers and short lists of bullet points. It can be difficult to achieve this in some eLearning contexts – there may be no easy way to clearly explain a concept, or provide an example without using lots of text.

## 4 What the eLearning industry needs to do about usability

eLearning companies must make a commitment to investing in usability and accessibility. This will produce a measurable return by delivering a better experience to customers and reducing development times and costs in the long run, while reaching a larger audience.

If you are responsible for adopting a usability strategy, you can also take the following actions.

Organise a usability and accessibility audit. The best way to do this is to have experts carry out a structured user test with real users or, if time and other resources are limited, a thorough expert evaluation. Use the feedback to create a usability development plan.

You should have a basic knowledge, or at least be familiar with the WAI WC3 accessibility guidelines, and ensure that your developers and web site maintenance personnel have a working knowledge of these guidelines.

Specify measurable accessibility targets in requirements documentation.

Involve real users in the requirements gathering stage and carry out usability testing at key moments in development. Doing so will not only deliver a more usable eLearning application, it will save time and money in the long run. It is more costly and time consuming to repair an interface in order to make it more usable or accessible than to incorporate usability from scratch.

Pursue an inclusive development process. Involve users who are representative of your target audience from the onset of your project. Include people with impairments to ensure that your application is usable for the widest possible audience. Our experience shows that involving representative samples of real user groups at key moments in the design of interfaces improves the quality of the interface, the user experience, and reduces lead times and costs.

## **5 About our analysis of the eLearning products featured**

Our analysis comprised of a basic user test and an expert assessment for accessibility. The user-test involved getting representative users to try out the applications for themselves. For our user test, we set two basic tasks:

**Task 1:** Starting at the first screen in the demo, get as far as completing the first exercise or assessment.

**Task 2:** After 5 minutes we stopped the participants and initiated a discussion of an unrelated topic. After a few minutes, we skipped back to the start of the demo and then asked them to return to where they had left off. The intention was to simulate an interruption.

Participants were encouraged to ‘think out loud’ while we observed and noted any problems they encountered. We carried out a structured interview after they had completed these tasks, to gain some insight into their perception of the usability and overall experience of the interface overall.

We also tested for accessibility, using a laptop with the mouse plugged out, to test keyboard-only navigation and JAWS 3.7, which is a popular screen reader. This helped to determine if the applications were usable by people who can’t see their screens and must therefore rely on a verbal description of content and controls.

### **5.1 Why test like this?**

Frontend advocate involving real users in the interface development process. Testing the proposed interface solution with real users at key stages throughout the development ensures that the proposed solution is optimised toward fulfilling their needs and reducing the risk of costly redevelopment later.

## 6 About Frontend

Frontend delivers innovative, user-friendly interface solutions that put the user first. We build interfaces that deliver significant benefits to business, both in terms of effective solutions and time/cost savings in development. Frontend has provided usability and accessibility consultancy and interface design services to Government agencies, eCommerce and eLearning companies. Frontend's unique approach to interface development is to integrate target users throughout the development process.

We are usability experts and view accessibility as an important component of general usability. Usability focuses on making software, websites and online applications or services easy for people to use. Accessibility focuses on making them equally easy for everyone to use, including people who may use assistive technologies such as screen readers, etc.

Frontend is committed to web accessibility. We have published various related white papers and articles, continually research accessible interface development and also host the Accessible email discussion list. Our policy is to endeavour to deliver accessible HTML with guidelines for implementation on all web projects undertaken by the company. We have presented papers on usability and accessibility at conferences in Ireland and Europe. Frontend has also made submissions (on request) to the Department of Justice, Equality and Law Reform on the establishment of a National Centre of Excellence in 'e-Design for all'.

To find out more about Frontend, visit [www.frontend.com](http://www.frontend.com)

The authors are happy to answer any queries you may have on issues discussed in this document. You can contact us by email at: [mail@frontend.com](mailto:mail@frontend.com) or alternatively at:

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## 7 Further reading and useful resources

Frontend hopes this document has been helpful in providing a first step towards making your eLearning applications and services more usable. You can find more information in the following articles and resources.

### 7.1 General Usability

**The Frontend InfoCentre** contains articles and information for companies interested in applying practical usability techniques.

[http://www.frontend.com/usability\\_infocentre/index.html](http://www.frontend.com/usability_infocentre/index.html)

**UserNews** is Frontend's monthly newsletter is a digest of features and articles that appear in our Infocentre. To subscribe to this newsletter, please email [usernews@frontend.com](mailto:usernews@frontend.com) with the word 'subscribe' in the subject line.

#### **The Frontend Process**

[http://www.frontend.com/services/frontend\\_process.html](http://www.frontend.com/services/frontend_process.html)

#### **About User Testing**

[http://www.frontend.com/services/about\\_user\\_testing.html](http://www.frontend.com/services/about_user_testing.html)

#### **Who is the User Anyway?**

<http://infocentre.frontend.com/servlet/Infocentre?access=no&page=article&rows=5&id=87>

### 7.2 Web Accessibility

**The WAI** (Web Accessibility Initiative) is a working group sponsored by the World Wide Web Consortium <http://www.w3.org/WAI/>

**WAI Web Content Accessibility Guidelines** <http://www.w3.org/TR/WCAG10/>

#### **Accessibility and Usability in e-Government**

[http://www.frontend.com/accessibility\\_paper.html](http://www.frontend.com/accessibility_paper.html)

**Access-ie** email discussion list relating to web accessibility and usability in Ireland.

<http://access.frontend.ie/mailman/listinfo/access-ie>

#### **Why “Bobby Approved” does not always mean “accessible”**

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