St. Francis Institute of Technology

Department of Computer Engineering

Academic Year: 2021-2022   **Semester: VIII**

Subject: Human Machine Interaction   **Class / Branch / Division: BE/CMPN/A**

Experiment No:- 3

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Aim:- Identify and evaluate usability value of an e-learning website. Usability Measurement tool for E-learning(UMTEL)

I-OBJECTIVE

1. To describe website usability criteria.
2. To learn how to identify usability problems in a website.
3. To use an online usability measurement scale for finding usability value of an e-learning website.
4. To compute the extent of conformance to usability norms for various website design parameters of an e-learning site.

II-THEORY

Human Computer Interaction and E-learning

E-learning course cannot be effective unless we understand the human factors like the learner's psychology, learning needs and behavior. HCI studies in this area attempt to explore learning interfaces, pedagogy and learning experience design.
Few research topics concerned with HCI and E-learning are-
- Parallelism in learning interfaces.
- Learner communication behaviors
- Cognitive understanding using multimedia
- Effectiveness of static and dynamic visuals
- Interfaces for collaborative learning
- Learning through direct-touch horizontal interfaces
- User interfaces for supporting innovation
- Design rules for effective learning interfaces

The effectiveness and efficiency of an e-learning website can be determined by measuring user's interaction patterns while using such a site. Measuring usability has many dimensions. A tool specifically desined for e-learning is often used to collect various performance data. This data is analysed by the tool to reveal patterns. In this experiment a tool named as Usability Measurement Tool for E-Learning (UMTEL) has been developed specifically and is used.
One needs to understand the nature of e-learning as being different from normal classroom learning.

What is E-learning?

E-learning is the mode of learning through electronically supported teaching material. In a larger context it makes use of information and communication technology (ICT) to build a online learning community by connecting knowledge centers to distant learners. E-learning is looked upon as the most flexible and cost-effective mode of learning anytime, anywhere at your own pace mainly out-side class-room set-up.

Generic website usability criteria

1. Accessibility: Making users with disabilities perceive, understand, navigate, and interact with the website. In short avoiding anything that might keep a visitor from being able to access the information on a website. Few checklist points are mentioned below …..
- Site load-time should be reasonable (avoid flash & add-ons)
- Text-to-background contrast should be adequate for readability
- Font size/spacing should be easy to read
- Images should have appropriate ALT tags.
- Site should have a custom not-found/404 page.

2. Identity : A website should quickly and clearly project its identity , its goals and its trustworthiness to the user. Few checklist points are mentioned below …..
- Company logo should be prominently placed
- Use of tagline is recommended to make company's purpose clear
- Use of tagline is recommended to make company's purpose clear
- User should get the company information quickly
- User should get contact information quickly

3. Navigation : User should be able to view contents of his relevance and interest with less efforts. Information architecture and navigation guidelines plays a vital role. Few checklist points are mentioned below …..
- Main navigation items should be easily identifiable
- Labels to navigation items should be clear & concise
- Number of buttons/links should be reasonable
- Links should be consistent & easy to identify
- Support user with site search feature for easy access

4. Content : Content is the most important part. Content needs to be consistent, organized, and easy to navigate through . Few checklist points are mentioned below …..
- Headings should be clear & descriptive
- Styles & colors need to be consistent
- Emphasis (bold, etc.) should be sparingly used
- Content should be concise , to-the-point & self-explaining
- URLs should be meaningful & user-friendly

Pedagogic Usability

Pedagogic Usability denotes whether the tools , content , interface and tasks of the e-learning environment support various learners to learn in various learning contexts according to selected pedagogical objectives.

There are several layers of website usability in context of learning like context-specific, pedagogic, general and technical usability. This is as shown below
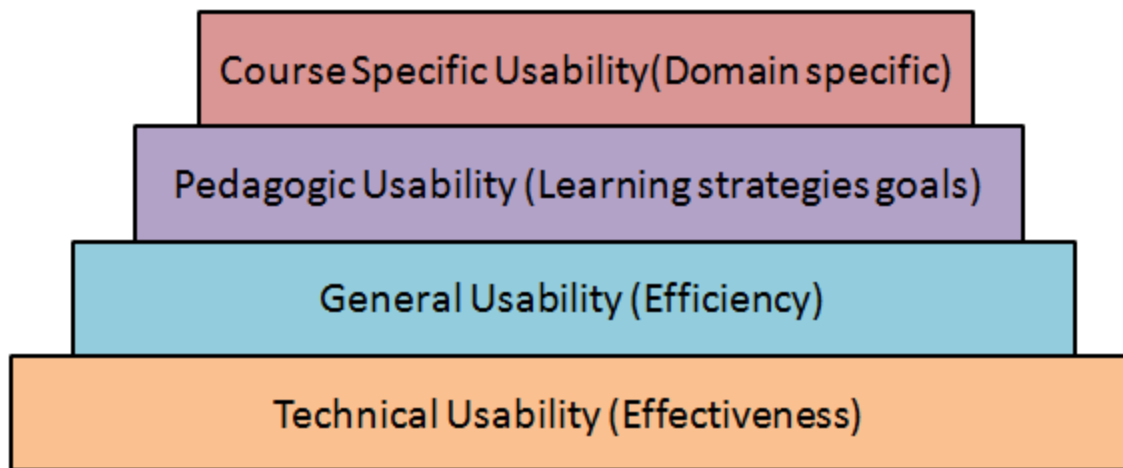
Figure 3.1 layers of website usability

Pedagogical usability should be the focal point of e-learning design. The academic content comprises of the learning objects while the pedagogy means learning strategies and mechanisms.
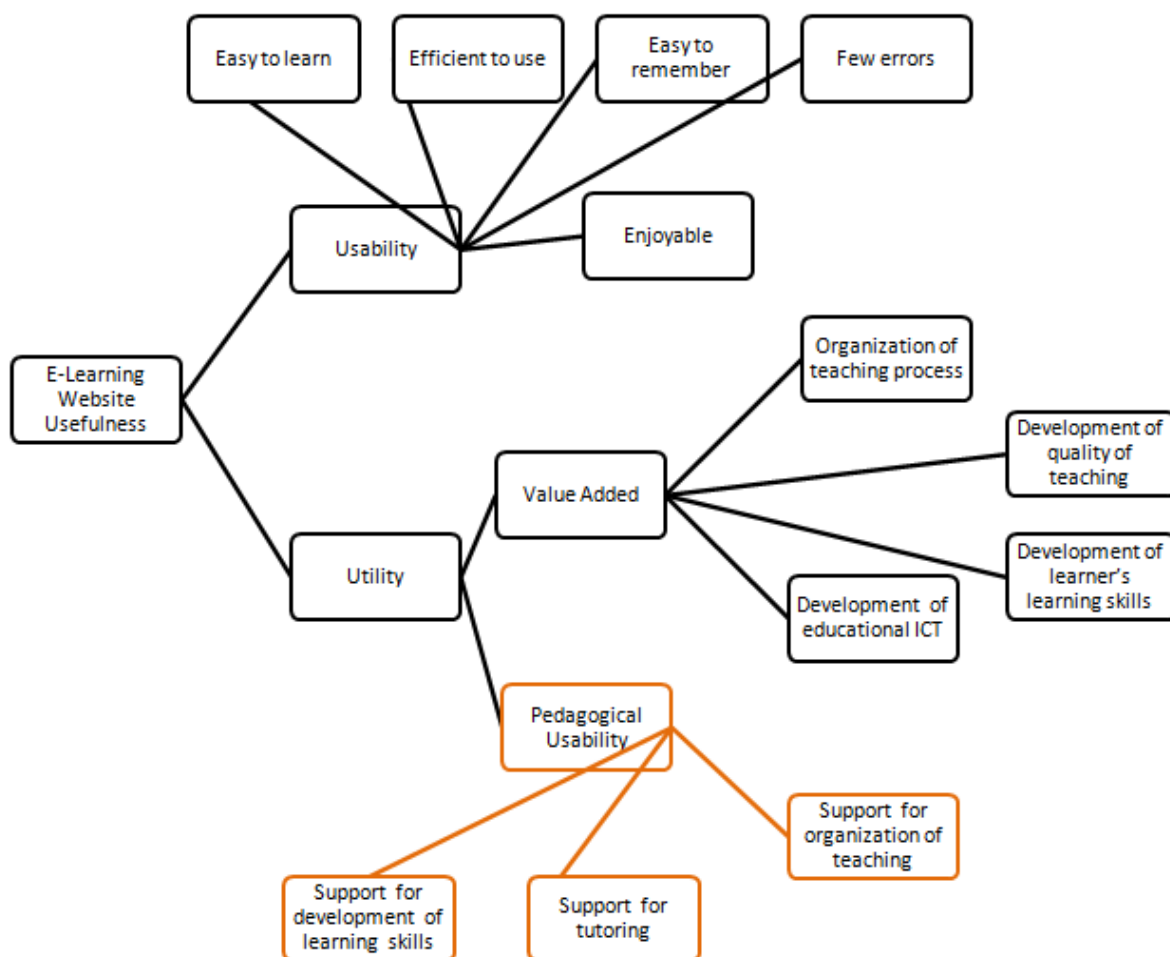
Figure 3.2 E-learning websites usefulness

[1]. Image reference : Silius, K. and Tervakari, A. "A multidisciplinary tool for the evaluation of usability,pedagogical usability, accessibility and informational quality of web-based courses " *The Eleventh International PEG.* (2003)

III-PROCEDURE

Steps

1. In this experiment, you will be using an online tool named UMTEL to evaluate usability of an e-learning web-site of your choice (target website).
2. The online Usability Measurement Tool for E-Learning Sites (UMTELS) is composed of six sets of checklists.
3. These checklists belong to the following categories.
    a) Content & Readability   b) Navigation   c) UI Design
    d) Performance   e)Pedagogy I   f)Pedagogy II
4. Each check-list has six statements.
5. The checklist statement describes usability aspect of the website for a specific category. (Refer to the a screenshot of the tool in figure below)

Figure 3.3 UMTEL tool screenshot

6. You are supposed to inspect the target website and judge to what extent do you feel that the statement shown in the tool is correct for that website.
7. Record your response whether you strongly agree , agree , fair , disagree or strongly disagree to the statement - by checking the relevant radio button below the statement.(Refer to the figure above)
8. Your response to each statement in the checklist will be assigned points by the tool automatically as follows

Table 3.1 Response table

Response	Strongly Agree	Agree	Fair	Disagree	Strongly Disagree
Point	1.00	0.75	0.50	0.25	0.00

9.You can view some illustrations from the table below to get an idea of the usability evaluation.

No.	Usability Category	Example
1	Content-Organization-Readability	

Figure 3.4 usability evaluation for Content Organization Readability

2	Navigation	Click to View

| Can easily locate current location on the website |
| Interface intuitive in guiding quick information retrieval |
| Flexibility in choice of actions to reach the destination |
| Links maintained without errors |
| No to multiple browser windows |
| Consistent layout of link and menu placement |

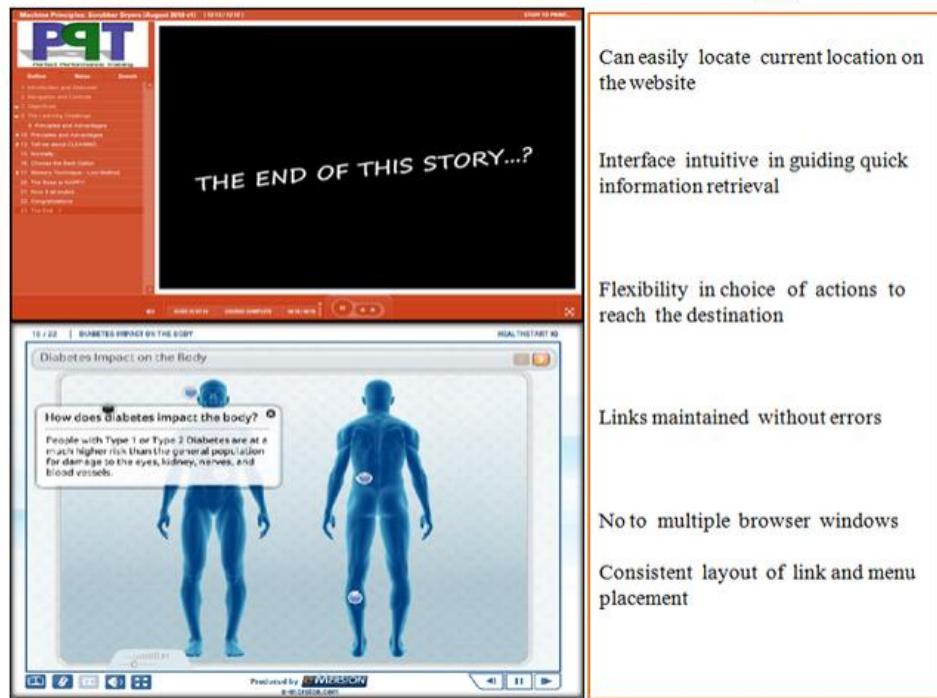Figure 3.5 usability evaluation for Navigation

3	User Interface Design	Close Click to View

Attractive graphical user interface

Use of limited and pleasant color schemes

No to excessive animations & graphics

Pages with consistent look and feel

Interface easy to understand or learn

Using useful and engaging interactivity

Figure 3.6 usability evaluation for User Interface Design

| 4 | Performance - Effectiveness | |

Figure 3.7 usability evaluation for Performance Effectiveness
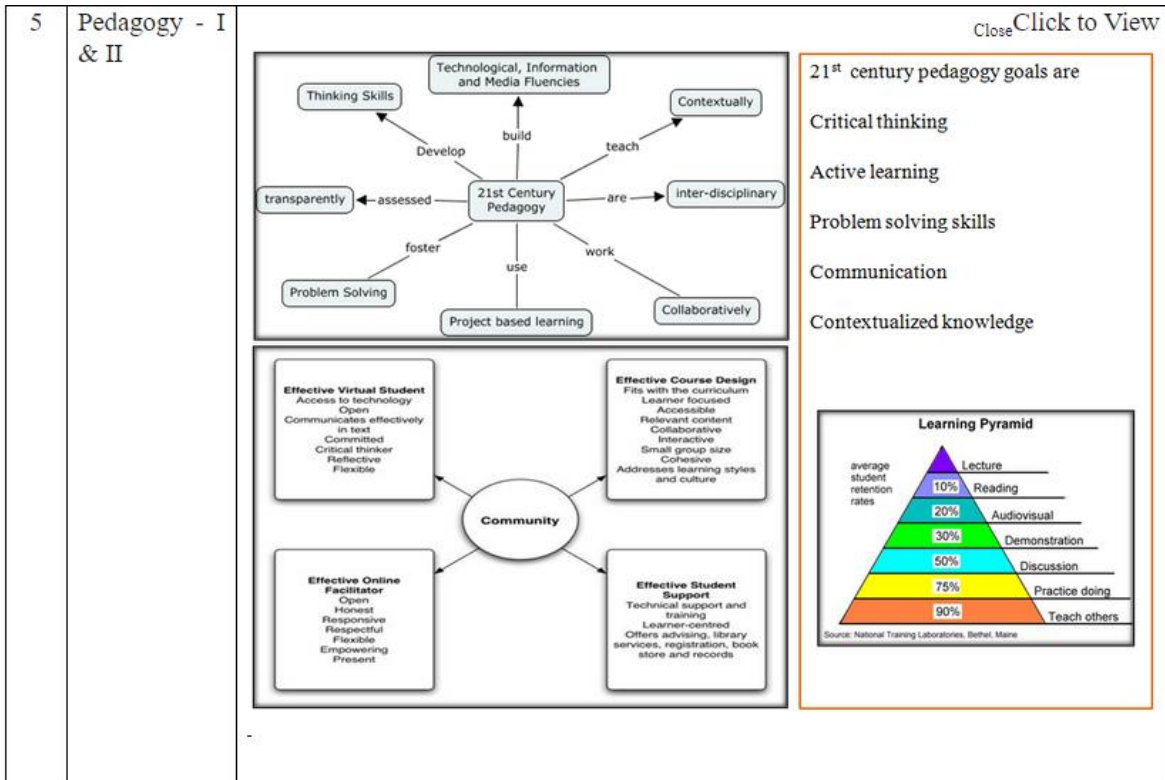
5	Pedagogy - I & II

Figure 3.8 usability evaluation for Pedagogy I and II

10. After you finish recording your responses for a category, you can move to the next category in the tool by clicking on the relevant tab within the tool. You may review the website in any sequence you wish.

11. After you finish reviewing the target website using all six checklists in the tool you can view the results by clicking the tab *"Find Website Score".* You will need to press another button *"Click To Refresh Scores"* to see the usability scores. The result table will display total points for each category and its usability level as shown in the image below. On the right hand side you will see a level indicator which indicates summed up scores in a graphical form. When one has multiple sites to compare such a level indicator gives a visual understanding of sites in comparison to each other.

Usability Measurement Tool for E-Learning Sites (UMTEL)
1. Open the e-learning web-site you want to evaluate in another browser window.
2. Select check-lists from the tabs below for evaluating features of the website.
3. Record your responses for each statement in the check-list by refering to the e-learning web-site.
4. Complete the full check-list. Do not leave any responses blank or unchecked.
5. Finally select the tab **Find Website Score** and click on **Click To Refresh Scores** button to compute usability score
6. You can revisit any tab or check-list and change your responses. You will need to once again compute the score.
7. Please save your data by taking **Print** of the checklist before you close the active UMTEL brower window.
8. To exit click **Exit UMTEL** button.

| Content-Organisation | Navigation | User Interface | Performance | Pedagogy - I | Pedagogy - II | **Find Website Score** |

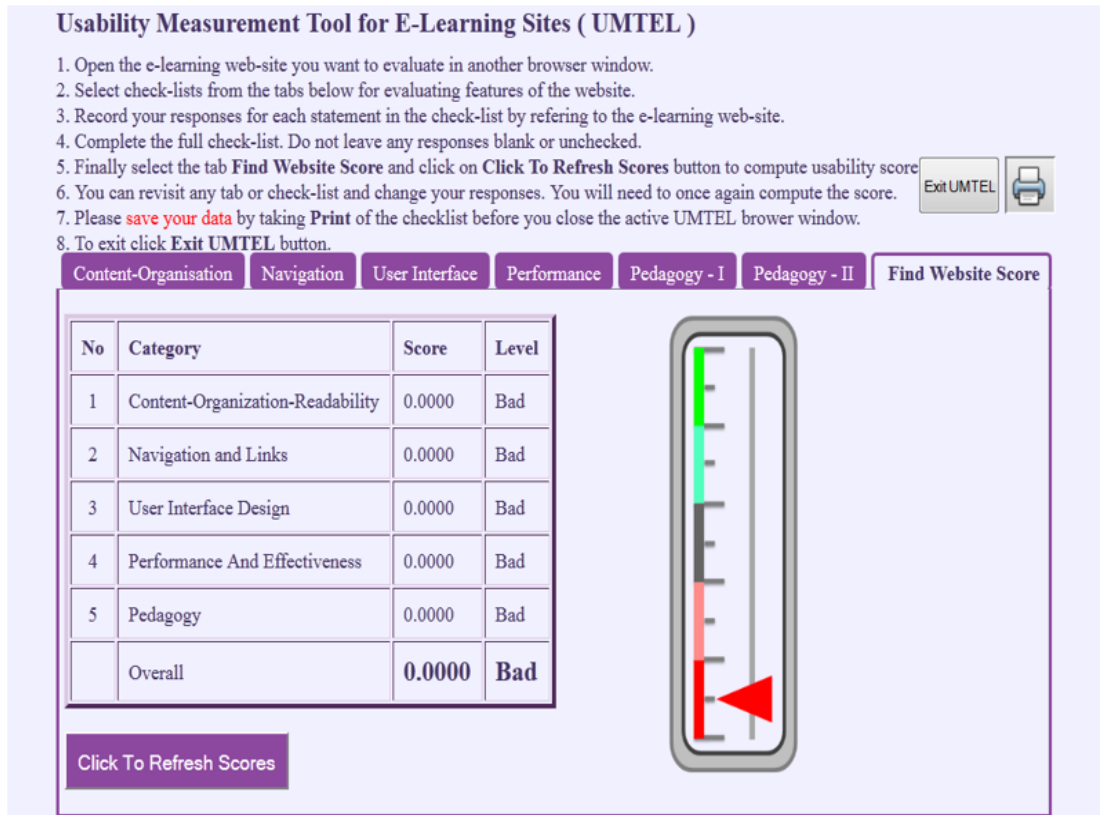| No	Category	Score	Level
1	Content-Organization-Readability	0.0000	Bad
2	Navigation and Links	0.0000	Bad
3	User Interface Design	0.0000	Bad
4	Performance And Effectiveness	0.0000	Bad
5	Pedagogy	0.0000	Bad
	Overall	**0.0000**	**Bad**

Click To Refresh Scores

Figure 3.9 Final result of the website score

12. Usability level for each category is assigned using the table below.

Table 3.2 Usability points and levels

Usability points	0<=X<=0.2	0.2<X<=0.4	0.4<X<=0.6	0.6<X<=0.8	0.8<X<=1.0
Usability Level	Poor	Bad	Moderate	Good	Excellent

Note : Your responses will not be stored in any database and will be available till the tool is there in the active browser window. If you close the browser window all your responses will be lost and you will have to fill up the responses again. There fore it is suggested to take a screen shot of each checklist and the final results after you finish recording your responses. You can use these screen shot to write your final usability report of a e-learning site.

IV-TOOL/TOOLS

An Usability Measurement Tool for E-Learning (UMTEL) was developed in house by the authors of Shakshat Virtual Lab at Indian Institute of Technology Guwahati to assist novice usability evaluators to evaluate the virtual laboratory's learning experience. (fig. 7 and fig.8) It was developed

using PhP, Mysql and Html programming languages. The tool records responses of evaluators to five categories of questions relevant to usability parameters. These categories are C1-Content / Organization and Readability ; C2- Navigation and Links ; C3- User Interface Design ; C4- Performance and Effectiveness ; C5-Pedagogic Usability. The responses to the questions were recorded using a semantic scale

V-IMPLEMENTATION

Simulator

To activate the UMTEL tool

Simulator

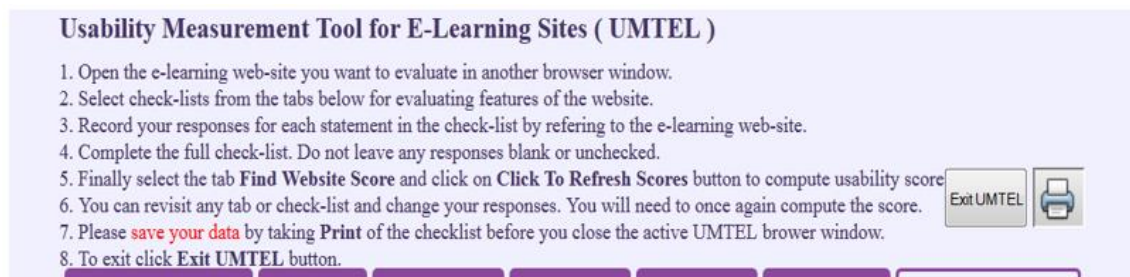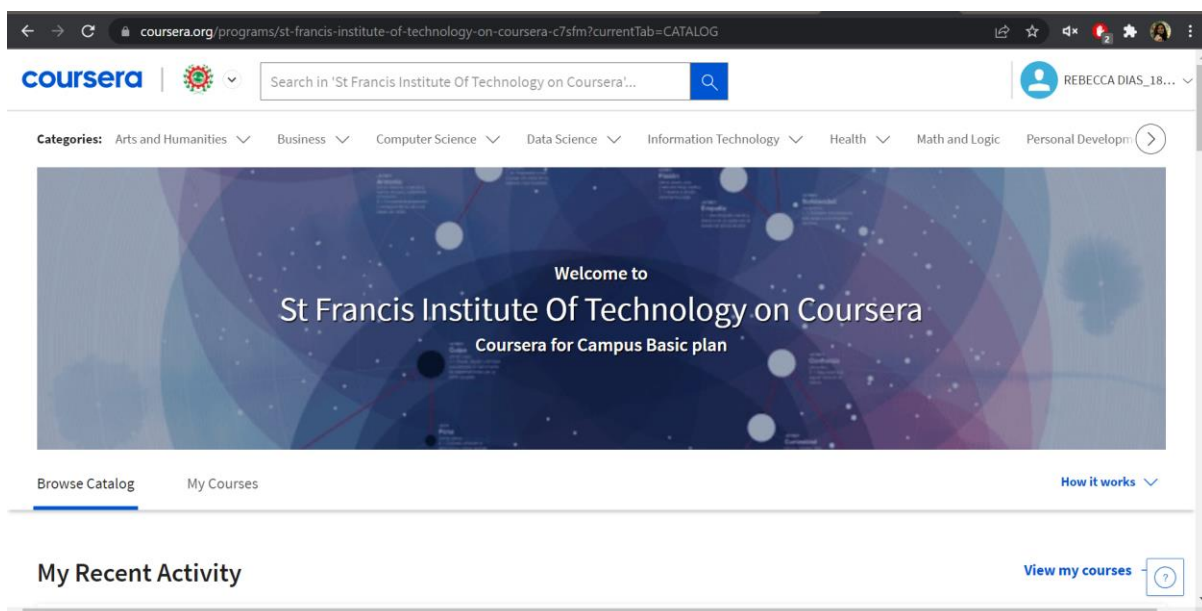**https://hci-iitg.vlabs.ac.in/umtel_simulator.html**

Figure 3.10 Steps to use the UMTEL tool
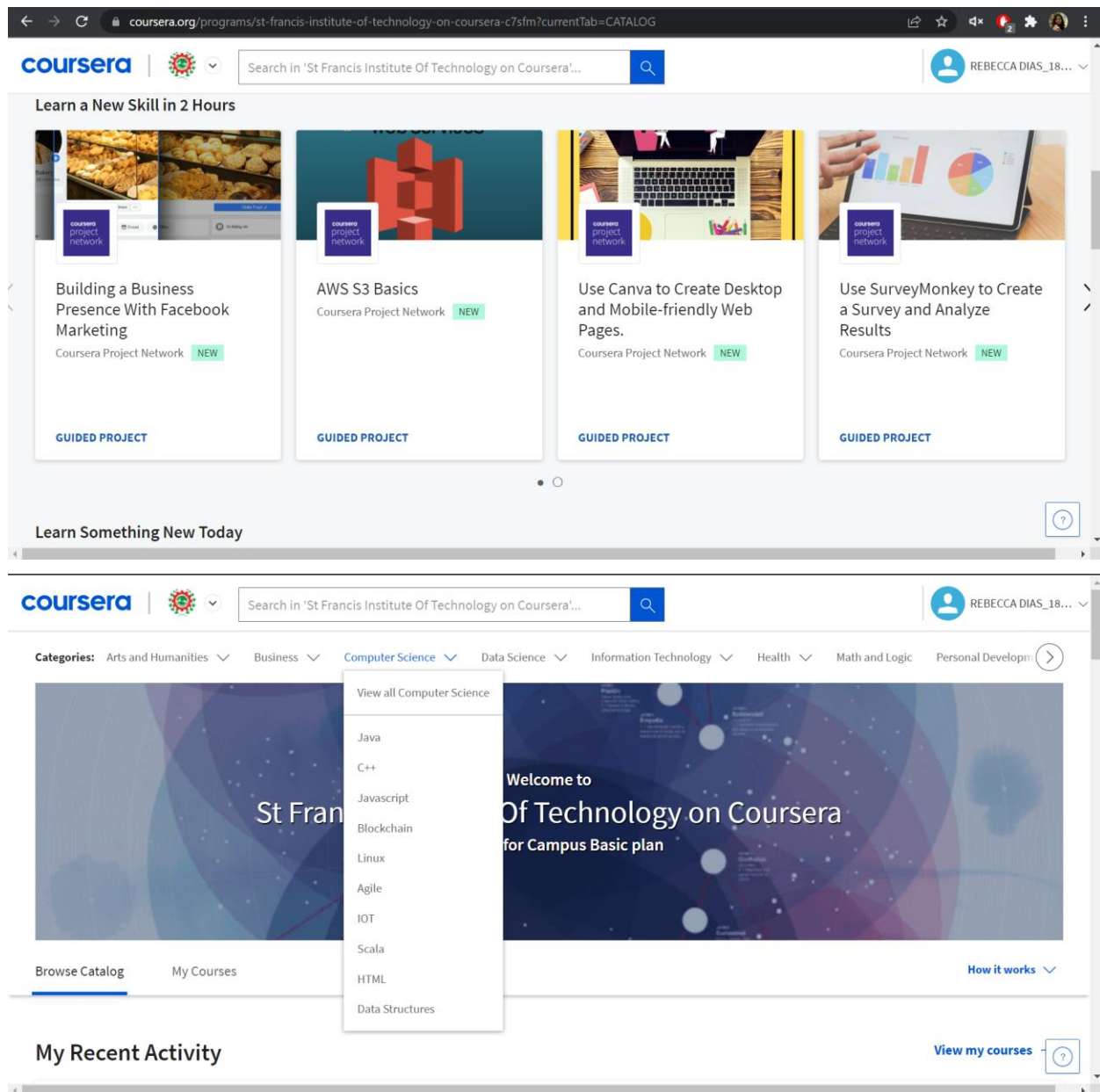
Open https://www.coursera.org/

Figure 3.11 Coursera website

a) Open the e-learning web-site you want to evaluate in another browser window.

b) Select check-lists from the tabs below for evaluating features of the website.

c) Record your response for each statement in the check-list by referring to the e-learning web-site.

d) Complete the full check-list.Do not leave any response blank or unchecked.

e) Finally select the <u>tab Find Website Score</u> and click on <u>Click To Refresh Scores button to compute usability score.</u>

f) You can revisit any tab or check-list and change your responses. You will need to once

again compute the score.

g) Please save your data by taking print of the checklist before you close the active UMTEL browser window.

h) To exit click EXIT UMTEL button

Figure 3.12 Content Organization tab

Navigation

1. I can easily know where I am at this website.
   ◉ Strongly Agree   ○ Agree   ○ Fair   ○ Disagree   ○ Strongly Disagree

2. This website provides useful cues and links for me to get the desired information
   ◉ Strongly Agree   ○ Agree   ○ Fair   ○ Disagree   ○ Strongly Disagree

3. It is easy to move around at this website by using the links or back button of the browser.
   ◉ Strongly Agree   ○ Agree   ○ Fair   ○ Disagree   ○ Strongly Disagree

4. The links at this website are well maintained and updated.
   ◉ Strongly Agree   ○ Agree   ○ Fair   ○ Disagree   ○ Strongly Disagree

5. The website does not open too many new browser windows when I am moving around.
   ◉ Strongly Agree   ○ Agree   ○ Fair   ○ Disagree   ○ Strongly Disagree

6. Placement of links or menu is standard throughout the website and I can easily recognise them.
   ◉ Strongly Agree   ○ Agree   ○ Fair   ○ Disagree   ○ Strongly Disagree

Figure 3.13 Navigation tab

User Interface

1 This website's interface design is attractive.
◉ Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

2 I am comfortable with the colours used at this website.
◉ Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

3 This website contains no feature that irritates me such as scrolling or blinking text and looping animations.
○ Strongly Agree ○ Agree ◉ Fair ○ Disagree ○ Strongly Disagree

4 This website has a consistent feel and look.
◉ Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

5 This website does not contain too many Web advertisements.
◉ Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

6 The design of the website makes sense and it is easy to learn how to use it.
◉ Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

Figure 3.14 User Interface tab

Performance

1 I need not wait too long to download a file or open a page.
○ Strongly Agree ● Agree ○ Fair ○ Disagree ○ Strongly Disagree

2 I can easily distinguish between visited and not-visited links.
○ Strongly Agree ● Agree ○ Fair ○ Disagree ○ Strongly Disagree

3 I can access this website most of the time.
● Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

4 This website responds to my actions as expected.
● Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

5 It is efficient to use this website.
● Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

6 This website always provides clear and useful messages when I don't know how to proceed.
● Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

Figure 3.15 Performance tab

Pedagogy - I

1 Website provides tools to support learning/authoring and collaboration viz. chat , discussion forum , sharing contents , podcasting etc .
● Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

2 This website provides excellent motivation to learn
○ Strongly Agree ● Agree ○ Fair ○ Disagree ○ Strongly Disagree

3 Website can effectively give feedback or guidance by assessing the progress and knowledge gained by the learner at any time.

◉ Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

4 The website always keeps track of learners progress / performance and informs through appropriate feedback.

◉ Strongly Agree ○ Agree ○ Fair ○ Disagree ○ Strongly Disagree

5 Wesbite improves critical thinking and prevents you from memorising information

○ Strongly Agree ○ Agree ◉ Fair ○ Disagree ○ Strongly Disagree

6 The website provides an excellent problem solving environment

○ Strongly Agree ◉ Agree ○ Fair ○ Disagree ○ Strongly Disagree

Figure 3.16 Pedadogy-I tab

Pedagogy - II

7 The website provides analysis and personalization of learning paths.

○ Strongly Agree ○ Agree ○ Fair ◉ Disagree ○ Strongly Disagree

8 The website content support the activities of the designer

○ Strongly Agree ○ Agree ◉ Fair ○ Disagree ○ Strongly Disagree

9 The website contents and interactions adapt to the learner profile and learning style

○ Strongly Agree ○ Agree ○ Fair ◉ Disagree ○ Strongly Disagree

10 The website supports all the tasks of concern to teachers and students in during teaching-learning process.

○ Strongly Agree ○ Agree ○ Fair ◉ Disagree ○ Strongly Disagree

11 Website provides clearity of learning goals , objectives and outcomes

○ Strongly Agree ○ Agree ◉ Fair ○ Disagree ○ Strongly Disagree

12 Website provides learner to find their own learning pathways

○ Strongly Agree ○ Agree ○ Fair ◉ Disagree ○ Strongly Disagree

Figure 3.17 Pedadogy-II tab

Find Website Score

No	Category	Score	Level
1	Content-Organization-Readability	1.0000	Excellent
2	Navigation and Links	1.0000	Excellent
3	User Interface Design	0.9167	Excellent
4	Performance And Effectiveness	0.9167	Excellent
5	Pedagogy	0.5833	Moderate
	Overall	**0.8833**	**Excellent**
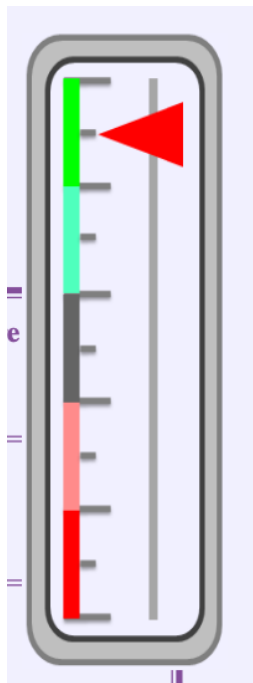
Figure 3.17 Website score table

VI-CONCLUSION

Identified and evaluated usability values of an e-learning website using Usability Measurement tool for E-learning(UMTEL)

VII- REFERNCES

https://hci-iitg.vlabs.ac.in/umtel.html

https://www.crazyegg.com/blog/principles-website-usability/

VIII-POST LAB QUESTION-ANSWER

Ques Explain 5 Key Principles Of Good Website Usability

Ans

Here are 5 key principles of good website usability. Make sure to consider these in your next project.

1. Availability and Accessibility

Let's start with a basic, yet central aspect of usability: the availability and accessibility of your site. If people try to access your website and it doesn't work — for whatever reason –your website becomes worthless.

Not only will users become frustrated, but you'll also lose out on new customers and revenue every time your site is unavailable.

Here are a few of the basics of availability and accessibility,

- **Server uptime** – It's important to ensure your visitors don't get an error trying to load your site. Invest in good hosting. Invest in good hosting. We never cut corners here, get a good web host that you can depend on.
- **Broken links** – Double check that there are no dead links on your site. SEO tools like Ahrefs and Screaming Frog will crawl your site for you and find all the broken links.

- **Mobile responsiveness –** Make sure your site can handle different screen sizes and slow connections. Google has also moved to a "mobile-first" index which means they index the mobile versions of sites. So a great mobile site will help you get better search results.

Amazon.com
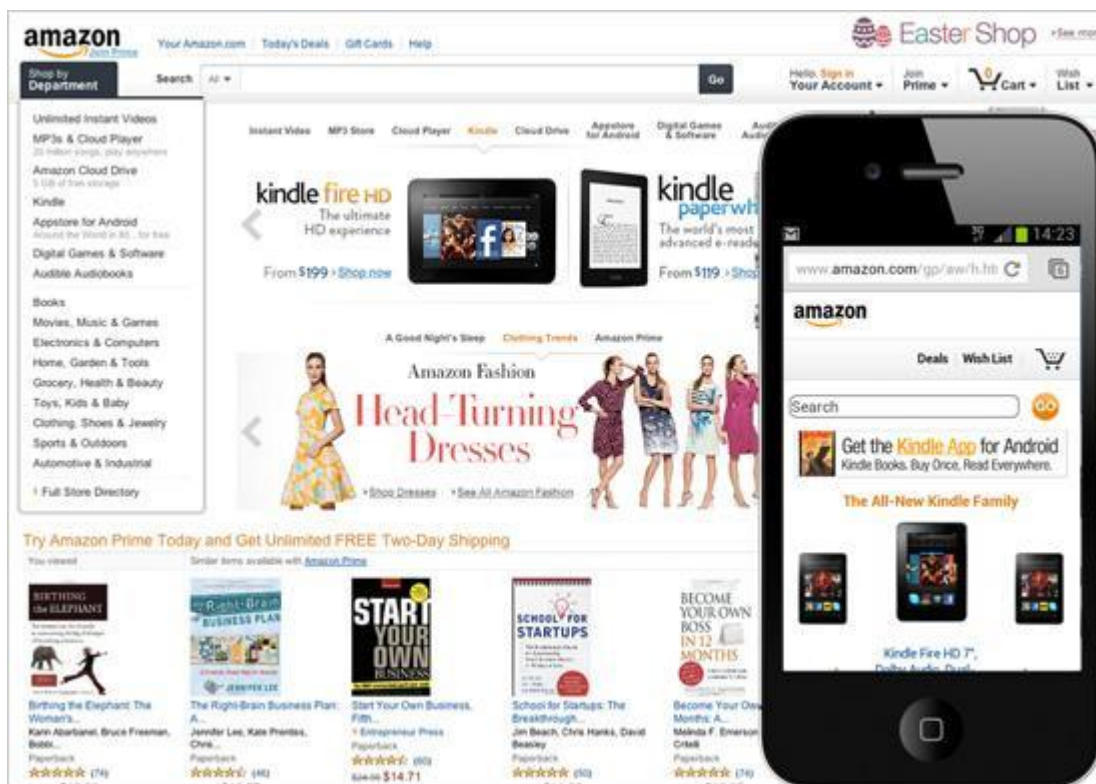
[Amazon.com](#) is a perfect example of an accessible website for several reasons.

First, the desktop version of the site is optimized for both tablets and desktop screens. The layout is flexible and adjusts automatically as the screen size is reduced. For mobile, there is an explicit version of the site with a clean interface, less clutter, and a clear hierarchy of the content. This stripped down mobile version works like a charm — even with a slow mobile internet connection.

Second, Amazon.com has almost [no downtime](#). Obviously, this is what you expect from a company that size. Still, the history of constant availability makes Amazon a reliable and trustworthy service platform.

Last but not least, Amazon is actively concerned with it's accessibility. On their [website](#), they state: "We're always looking for ways to improve usability of the site for our customers, including those with disabilities." For screen readers, they specifically recommend their mobile site with a cleaner presentation of the content.

2. Clarity

You could say the core of usability is clarity.

If you distract or confuse your visitors, they will either need more time to find what they came for, or they might forget their initial goal all together. Either way, they will not experience your website as user-friendly and chances are that they leave dissatisfied and with no intention of coming back.

Visitors come to your site with certain goals in mind. It is your job to help them reach these goals as quickly as possible. If you can manage to do that, your visitors will be pleased and you have laid the groundwork for a positive experience.

A clear and usable design can be achieved through:

- **Simplicity** – Focus on what's important. If you don't distract your vistors they will be more likely to do what you want them to do.
- **Familiarity** – Stick to what people already know. There is nothing wrong with looking at other sites for inspiration.

- **Consistency** – Don't get cute. Create a consistent experience across your entire website to keep your visitors mind at ease.

- **Guidance** – Take your visitors by the hand. Don't expect your visitors to explore your site all on their own. Instead, guide them through your site and show them what you have to offer.

- **Direct feedback** – Feedback is essential to any interaction. The moment people interact with your site, make sure to offer an indication of success or failure of their actions.

- **Good information architecture** – Understand your visitors' mental models and how they would expect you to structure the content on your site.

Apple

Apple is known for its lean and user-friendly products. The extreme simplicity of the brand and the focus on what really matters can also be found on their website.

The overall appearance is very elegant and minimalist. There is a lot of white space and only relevant content is presented in a clean and straightforward way. The classical top navigation menu holds the logo and home button, the store, different product categories, a link to the support page, and a search function. The footer of the site holds classical secondary links, such as the Terms of Use and Privacy Policy.

There is no distraction, making it very easy to pursue your goals on the site. For example, when choosing the category "Mac" in the top navigation, you get a visual overview of the different Mac products available. Besides, you get a sub navigation listing all related products relevant for this category. The clear design makes the website just as intuitive to use as all other Apple products.

3. Learnability

Learnability is another important aspect of usability.

It should be your goal to design intuitive interfaces — interfaces that don't require instructions, or even a long process of trial and error to figure them out. Key to intuitive design is to make use of what people already know, or create something new that is easy to learn.

By now, people are familiar with a lot of design concepts used on the web. By using these concepts consistently, you meet your visitors' expectations. This way, you help them reach their goals more quickly. As human beings, we like patterns and recognition, which is why we are better at handling familiar situations rather than unfamiliar ones.

If you use new concepts in your design, make sure to use them consistently and give people a hand during the initial learning phase. For example, you can offer additional information, or instructions the first time they use your site or product. Keep it simple and visual to help people remember new concepts.

Microsoft
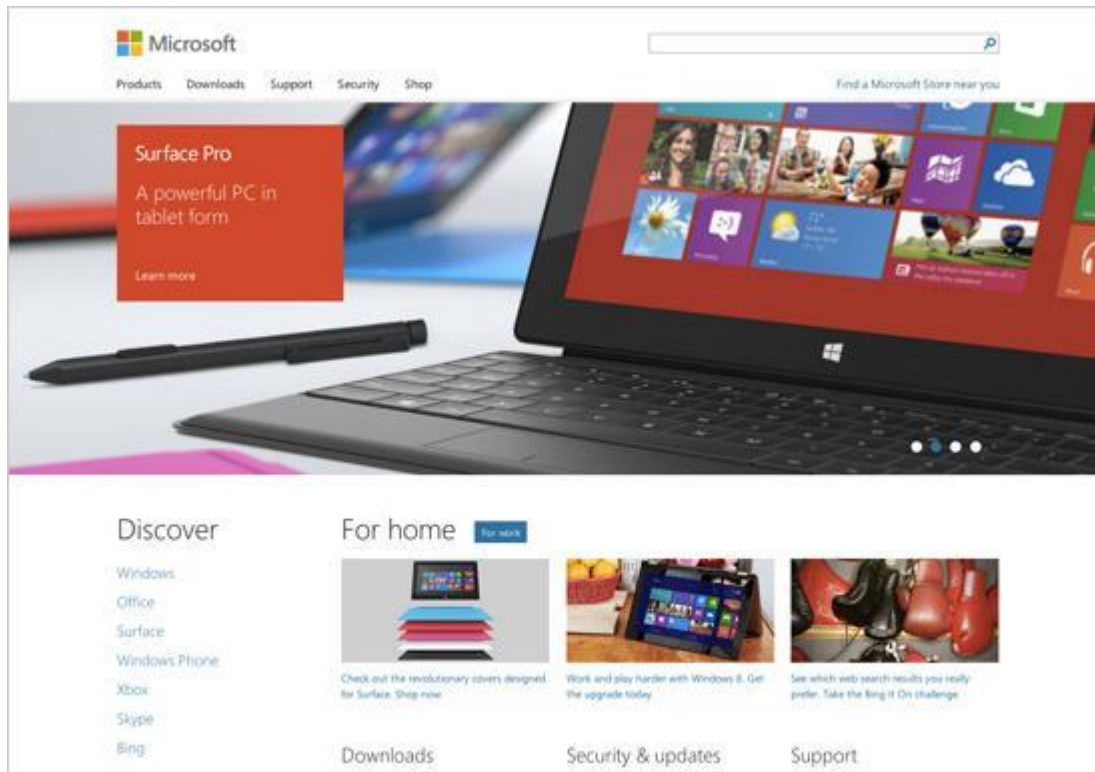
[Microsoft](#) redesigned their website last year.

While the design is very fresh and modern, the layout of the site is classical and in line with what most of us know about websites. At the top left, there is the logo telling us where we are. On the top right, there is a search field, allowing us to search the site for any random term. Below, there is the top navigation menu featuring the central content categories of the site. When clicking on the links, we get a dropdown menu with all the content available within that category.

Then, there is a big visual header element which alternates between four different images. The header is followed by what we know as content area with a vertical sub navigation menu featuring different topics that can be "discovered" and some highlighted content. Below that, there is a social media section and a comprehensive footer area which features Other Microsoft Sites and a lot more secondary links.

The site is very clean and easy to navigate. The familiar layout helps people to quickly find what they are looking for.

4. Credibility

Credibility is a crucial aspect of any website.

Even if people find the content they are looking for, if they don't trust you, that content is worthless. Your website could cause site visitors to be skeptical about your business in any number of ways including whether or not you really exist, your reputation, or the quality of your content.

It is important that people know you are a real company with real people. Offer a clear "About Us" page together with your contact details and if possible a physical address.

Of course your content also plays an important role for the perceived trustworthiness of your site. Make sure you are honest and precise about your content. Avoid mistakes, such as incorrect grammar or misspellings. Don't be modest about your expertise. If you are an expert in your field, make sure people know it. For example, you can show third-party testimonials, work references, or the number of your social media followers to win your visitors over.

L'ORÉAL

The brand L'ORÉAL does a great job when it comes to building web credibility.

Besides the professional design, which matches the exquisite reputation of the brand, they offer a lot of high quality content to demonstrate their expertise.

For example, an entire content section covers information about Research and Innovation. This shows the engagement of the brand in professional research and reflects the high quality of its products. Another content section addresses Commitments, demonstrating that the brand takes its social responsibilities seriously.

Besides the actual research, the brand also makes use of expert testimonials and photographs of celebrities, such as Julia Roberts, to convince people of the quality and popularity of their products. Another trust indicator is that it is very easy to get in contact with L'ORÉAL. The brand is not only available via social media, but also a physical address and phone number is easy to find.

5. Relevancy

Last but not least, relevancy contributes to good website usability.

It is not enough that your website is clear, your content must also be relevant. Again, it is essential that you know your users and why they visit your site.

Start with defining who your users are. Second, talk to them to find out what their goals are when visiting your site. Third, define user scenarios that demonstrate in which situation people visit your site to find what kind of content. Any design decision that you make should result in a more user-friendly website for your users.

Nike
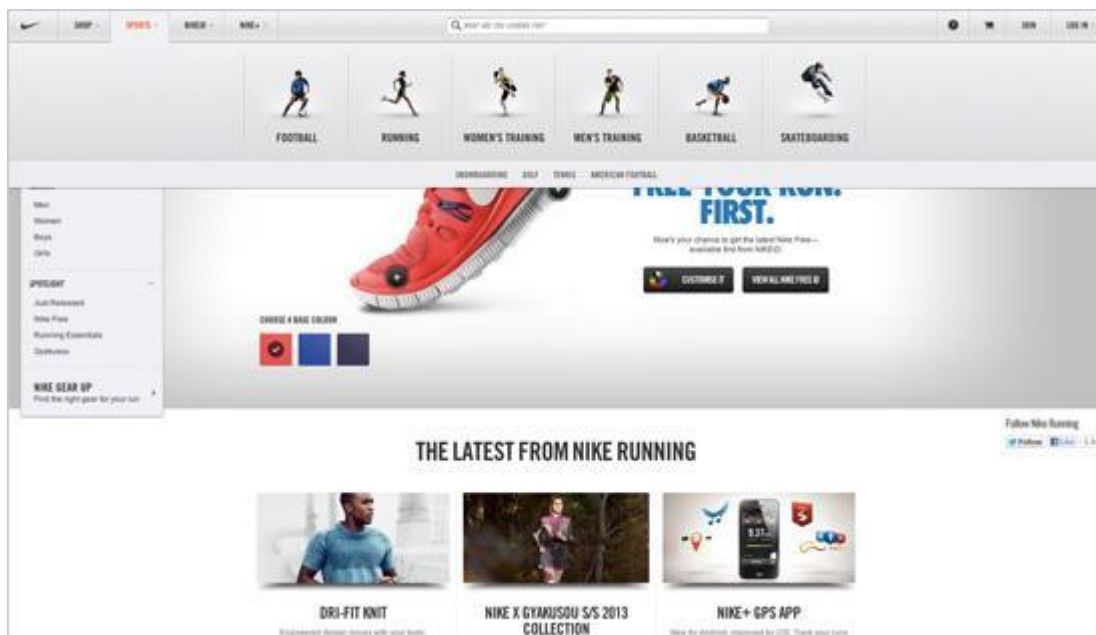
Nike has done an exemplary job in prioritizing their content with focus on their users.

The brand offers sportswear and equipment for different sports. When coming to their website, you can either choose to browse their store by Men, Women, or Kids, or you can browse by sports. Instead of only grouping people by their age or gender, Nike recognizes their visitors as sportspeople within a certain discipline.

For example, if you are looking for new running shoes, you don't even care about all the tennis or indoor sports shoes they also have. Nike allows you to browse their store according to your very specific goal.

Usability means test, test, and test again

Good usability is not attained overnight.

It requires thorough user research and an iterative approach of constant testing and refining.

Good usability depends on whether your website is available, clear, credible, learnable, and relevant to the people who actually use it.