

COURSE NAME: ICT Electives II
COURSE CODE: NITE63410
CHAPTER 1: What is Interactive Design?



Compiled by: Mrs. K.E Mamabolo

Topic Objectives

After completing this module, you should be able to:

- Explain the difference between good and poor interaction design.
- Describe what interaction design is and how it relates to human-computer interaction and other fields.
- Explain the relationship between the user experience and usability.
- Introduce what is meant by accessibility and inclusiveness in relation to human computer interaction.
- Describe what and who is involved in the process of interaction design.
- Outline the different forms of guidance used in interaction design.
- Evaluate an interactive product and explain what is good and bad about it in terms of the goals and core principles of interaction design



Overview

- **How many interactive products are there in everyday use?**
- How many are actually easy, effortless, and enjoyable to use?
- Some are a joy to use, where tapping an app and flipping through photos is simple, smooth, and enjoyable.
- Others, just making a simple transaction like buying a train ticket can be very frustrating where the credit card is not recognised after completing a number of steps and then it makes you start again from scratch. **Why is there a difference?**
- Several products that expect users to interact with them, have been designed mainly with the user in mind as such they are generally easy and enjoyable to use.
- On the other hand, others have not been designed with the users in mind; instead, they have been engineered mainly as software systems to execute expected functions.

Overview

- For example, setting the time on a stove that requires a combination of buttons to be pressed that are not obvious as to which ones to press together or separately.
- **This might work effectively**, however, at the expense of **how easily they will be learned** and **used in a real-world context**.
- A well-known user experience (UX) expert, Alan Cooper (2018), laments over the fact that most of today's software still suffer from the same interaction errors that were there 20 years ago.
- Why is this still the case, since interaction design has been existing for over 25 years and more UX designers exist in industry than ever before?
- He draws attention that countless interfaces of new products do not adhere to the principles of interaction design endorsed in the 1990s.
- He further remarks that the most basic of UX principles are not followed by several apps such as **offering an “undo” option**.

Overview

- How can this situation be rectified to ensure that the norm in all new designed products provide good user experiences?
- This can be achieved by being able to understand how to **moderate the negative traits of the user experience** whilst **enriching the positive ones**.
- This necessitates designing interactive products that are **easy, effective, and pleasurable to use** from **the users' perspective**.
- This chapter examines the fundamentals of interaction design, furthermore, the chapter covers the,
 - difference between good and poor design,
 - highlighting how products can differ radically in how usable and enjoyable they are

Good and Poor Design

- A main purpose of interaction design is to create usable interactive products
- That is, products that are commonly easy to learn, efficient to use, and afford a pleasant user experience.
- A comparison of well-designed and poorly designed products is a good place to start thinking about how to design usable interactive products.
- Through identifying the specific weaknesses and strengths of different interactive products, we can begin to understand what it means for something to be usable or not.
- Contrast is made in the following section of voice-mail system used in hotels and the ubiquitous remote control with two well-designed examples of the same products that perform the same function.

Voice-Mail System

- What is problematic with the hotel voice-mail system given in the scenario?
 - It is annoying.
 - It is unclear.
 - **It is incompetent, requiring the user to perform several steps for elementary tasks.**
 - It is complex to use.
 - It has no means of letting the user to take a quick look whether they have messages or how many there are.
 - The user must pick up the handset to notice and then run through several steps to listen to them.
 - **It is not clear what to do, partial instructions are by the system and by a card beside the phone.**

Voice-Mail System

- The hotel voice mail is compared to the phone answering machine presented in Figure 1.1

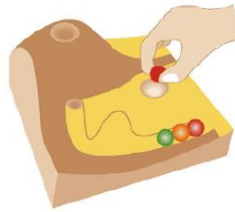


Figure 1.1 The marble answering machine
Source: Adapted from Crampton Smith (1995)

- The model displays a phone answering machine with incoming messages represented using marbles.
- The marbles that have moved into the pinball-like outlet signifies the number of messages.
- Placing one of these marbles into a dent on the machine causes the recorded message to play.

Voice-Mail System

- Dropping the same marble into a different dent on the phone dials the caller who left the message.
- How does the marble answering machine differ from the voice-mail system?
 - It uses familiar physical objects that indicate visually at a glance how many messages have been left.
 - **It is aesthetically pleasing and enjoyable to use.**
 - **It requires only one-step actions to perform core tasks.**
 - It is a simple but elegant design.
 - It offers less functionality and allows anyone to listen to any of the messages.

Voice-Mail System

- The marble answering machine is considered a design classic. It was created by Durrell Bishop while he was a student at the Royal College of Art in London (described by Crampton Smith, 1995).
- One of his goals was to design a messaging system that represented its **basic functionality** in terms of the **behaviour of everyday objects**.
- To do this, **he capitalized on people's everyday knowledge of how the physical world works**.
- In particular, **he made use of the ubiquitous everyday action of picking up a physical object and putting it down in another place**.
- This is an example of an **interactive product designed with the users in mind**.

Voice-Mail System

- The focus is on providing them with a **pleasurable experience** but one that also **makes efficient** the **activity of receiving messages**.
- However, it is important to note that although the marble answering machine is an **elegant and usable design**, it would not be **practical in a hotel setting**.
- One of the main reasons is that it is **not robust enough** to be **used in public places**; for instance, the marbles could easily get lost or be taken as souvenirs.
- Also, **the need to identify the user** before allowing **the messages to be played** is essential in a hotel setting.

Voice-Mail System

- Therefore, **when considering the design of an interactive product, it is important to consider where it is going to be used and who is going to use it.**
- The marble answering machine would be more suitable in a home setting

Remote Control

- Every home entertainment system, be it the smart TV, set-top box, stereo system, and so forth, comes with its own remote control.
- Each one is different in terms of how it looks and works.
- Many have been designed with a **dizzying array of small, multi-coloured, and double labelled buttons** (one on the button and one above or below it) that often seem arbitrarily positioned in relation to one another.
- Many viewers, especially **when sitting in their living rooms**, find it difficult to **locate the right ones**, even for the **simplest of tasks**, such as **pausing** or **finding the main menu**.

Remote Control

- It can be especially frustrating for those who need to put on their **reading glasses** **each time to read the buttons.**
- The **remote control appears** to have **been put together** very much as an **afterthought.**

What to Design

- Designing interactive products requires considering
 - **who** is going to be using them,
 - **how** they are going to be used, and
 - **where** they are going to be used.
 - **understand the kind of activities people are doing** when interacting with these products.
- The **appropriateness of different kinds of interfaces and arrangements of input and output devices** **depends on what kinds of activities are to be supported.**
- **There are also many ways of designing how users can interact with a system,** for instance, via the use of **menus, commands, forms, icons, gestures,** and so on.

What to Design

- The Internet of Things (IoT) now means that many products and sensors can be connected to each other via the Internet, which enables them to talk to each other
- While more cost-effective and efficient, it is impersonal and puts the onus on the person to interact with the system.
- A key question for interaction design is this: “How do you optimize the users’ interactions with a system, environment, or product so that they support the users’ activities in effective, useful, usable and pleasurable ways?”

What to Design

- **Efficiency: Reducing Effort and Time**
 - **Example:** *In an e-commerce website, implementing an **auto-fill feature** for shipping and payment details reduces the steps required to complete a purchase, making the process faster and more convenient for users.*
- **Usefulness: Ensuring the System Meets User Needs**
 - **Example:** *A **fitness tracking app** that provides personalized workout recommendations based on user activity levels and goals ensures that the app is relevant and valuable to the user.*
- **Usability: Making the System Easy to Learn and Navigate**
 - **Example:** *A **mobile banking app** that uses a simple, intuitive interface with clear icons and step-by-step guides ensures that users can easily transfer money, check balances, and pay bills without confusion.*
- **Pleasurable Experience: Enhancing User Engagement and Satisfaction**
 - **Example:** *A **music streaming service** that curates personalized playlists and uses visually appealing album artwork enhances the user's emotional connection and enjoyment while using the app.*

What to Design

- **One could use intuition** and hope for the best.
- Alternatively, **one can be more principled in deciding which choices to make by basing them on an understanding of the users.**
- This involves the following:
 - Considering what people **are good and bad at**
 - Considering **what might help people with the way they currently do things**
 - Thinking through **what might provide quality user experiences**
 - **Listening to what people want and getting them involved in the design**
 - Using **user-centered techniques** during the design process

What Is Interaction Design?

- By interaction design, we mean the following:
 - Designing interactive products to **support the way people communicate and interact in their everyday and working lives**
 - Put another way, **it is about creating user experiences that enhance and augment the way people work, communicate, and interact.**
- Author's view on interaction design:
 - More generally, Terry Winograd originally described it as **“designing spaces for human communication and interaction”** (1997, p. 160).
 - John Thackara viewed it as **“the why as well as the how of our daily interactions using computers”** (2001, p. 50), while
 - Dan Saffer emphasized its artistic aspects: **“the art of facilitating interactions between humans through products and services”** (2010, p. 4).

The Components of Interaction Design

- Interaction design is viewed as fundamental to many disciplines, fields, and approaches that are concerned with **researching and designing computer-based systems for people.**
- It can be confusing to try to work out the differences between them as many overlap.
- The main differences between interaction design and the other approaches referred to in the figure come largely down to which methods, philosophies, and lenses they use to study, analyse, and design products.
- Another way they vary is in terms of the scope and problems they address.

Who Is Involved in Interaction Design?

- Designers need to **know many different things** about **users**, **technologies**, and the **interaction** among them to **create effective user experiences**.
- At the least, they need to **understand how people act** and **react to events** and how they **communicate and interact** with each other
- To be able to **create engaging user experiences**,
 - they also need to **understand how emotions work**;
 - what is meant by **aesthetics, desirability**, and
 - the role of **narrative in human experience**;
 - they also need to understand the **business side, technical side, manufacturing side, and marketing side**.

Who Is Involved in Interaction Design?

- It is difficult for one person to be well versed in all these diverse areas and **know how to apply the different forms of knowledge to the process of interaction design.**
- Interaction design is ideally carried out by multidisciplinary teams, who to include in a team will depend on several factors, including a company's design philosophy, size, purpose, and product line.
- One of the benefits of bringing together people with **different backgrounds and training is the potential of many more ideas being generated**, new methods developed, and more creative and original designs being produced.
- The downside is, however, the costs involved.

Who Is Involved in Interaction Design?

- The more people there are with different backgrounds in a design team, **the more difficult it can be to communicate and make progress with the designs being generated.**
- Why? People with different backgrounds have different perspectives and ways of seeing and talking about the world.
- **What one person values as important others may not even see** (Kim, 1990).
- In practice, the makeup of a given design team depends on the kind of interactive product being built

The User Experience

- The **user experience** refers to **how a product behaves** and is **used by people in the real world**.
- Other authors defines user experience as follows:
 - “**all aspects of the end user’s interaction with the company, its services, and its products.**” (Jakob Nielsen and Don Norman, 2014)
 - “**Every product that is used by someone has a user experience**” (Jesse Garrett ,2010, p. 10).
- More explicitly, it is about **how people feel about** a product and **their pleasure** and **satisfaction** when **using it, looking** at it, **holding** it, and **opening** or **closing** it.
- It includes their **overall impression** of how good it is to use, right down to the **sensual effect small** details it has on them, like how smoothly a switch rotates or the **sound of a click** and the touch of a **button when pressing** it.

The User Experience

- An **important aspect** is the **quality of the experience** someone has, **be it a quick one**, such as **taking a photo** (Law et al., 2009).
- It is important to point out that **one cannot design** a **user experience**, only design for a user experience.
- To be specific, a **sensual experience cannot be designed**, but features that can **evoke it** are **created in the design**.
- **User experience** UX is also referred to as UXD with **D encouraging design thinking that focuses** on the **quality of the user experience** rather than on the **set of design methods to use** (Allanwood and Beare, 2014).

The User Experience

- As Don Norman (2004) emphasis that **“It is not enough that we build products that function, that are understandable and usable, we also need to build joy and excitement, pleasure and fun, and yes, beauty to people’s lives.”**
- Other **central aspects of importance** are the **usability, functionality, aesthetics, content, look and feel, and emotional attraction.**
- In addition, Jack Carroll (2004) stresses other wide-reaching aspects, including **fun, health, social resources** that **develop and maintained** through **social networks**, shared values, goals, and norms, and **cultural identity**, such as age, ethnicity, race, disability, family status, occupation, and education.

Understanding Users

- The main objective for having a **better understanding of people** in the contexts in which they live, work, and learn is that it assist designers to:
 - understand how to design interactive products that **provide good user experiences** or **match a user's needs**.
- **Understanding individual differences** assist designers to appreciate that:
 - **one size does not fit all**, what works for one user group may be completely inappropriate for another.
- For instance, **children have different expectations than adults** about how they want to learn or play.

Understanding Users

- **Interactive quizzes and cartoon characters** assist **children** along to be **highly motivated**, whereas most **adults find them annoying**.
- **Everyday objects** like clothes, food, and games **are designed differently** for children, teenagers, and adults, **so too should interactive products be designed** for **different groups of users**.
- Learning about users, what they do, **can also reveal incorrect assumptions** that designers may have **about user groups** and **what they need**.
- It is assumed that due to **weakening vision and dexterity**, old people want things to be big, that is:
 - **text or graphical elements appearing on a screen or the physical controls, like dials and switches, used to control devices.**

Understanding Users

- However, they **do not like to consider** themselves as **lacking in cognitive and manual skills**.
- Johnson and Finn, (2017) states that **being aware of people's sensitivities**, such as aging, is as important as **knowing how to design for their capabilities**.
- While **many older adults** now **feel comfortable** with and use a range of **technologies**, like emails, etc., **they may resist adopting new technologies**.
- Knowles and Hanson, (2018) states that they do not want to **waste their time** getting **caught up by the distractions** that digital life brings, for instance, **not wanting to be “glued to one's mobile phone”** like younger generations.

Understanding Users

- **Understanding cultural differences** is also a **vital concern** for interaction design, **especially for products** intended for user groups from **different countries**.
- An example of a **cultural difference** is the **dates and times** used in **different countries**, especially if intended for global use.
- A concern also for products that have time as a function, such as operating systems, digital clocks, or car dashboards. **To which cultural group do they give preference?**
- **How do they alert users to the format that is set as default?**
- This raises the question of **how easily an interface designed for one user group can be used and accepted by another**.

Understanding Users

- The big question is now, “Why is it that certain products, like a fitness tracker, are universally accepted by people from all parts of the world, whereas websites are designed differently and reacted to differently by people from different cultures?”

Accessibility and Inclusiveness

- **Accessibility** means the **extent to which** an **interactive product** is **accessible by** as **many people as possible**.
- Companies like Google and Apple provide tools for their developers to promote this, the focus is on people with disabilities.
- **Inclusiveness** refers to being **fair, open, and equal** to **everyone**.
- **Inclusive design** is an **all-embracing approach** where **designers go all-out** to make their **products and services** assist the **largest possible number** of people.
- An example is **ensuring that smartphones are being designed for all and made available to everyone** —regardless of their **disability, education, age, or income**.

Accessibility and Inclusiveness

- **Whether or not a person is considered to be disabled changes over time with age**
- **Disability can result because technologies are often designed in such a way as to necessitate a certain type of interaction that is impossible for someone with a deficiency.**
- **Disability in this context is viewed as the result of poor interaction design between a user and the technology, not the deficiency alone.**
- **Accessibility, on the other hand, opens up experiences so that they are accessible to all.**

Accessibility and Inclusiveness

- **Technologies** that are **now mainstream** once started out as solutions to **accessibility challenges**.
- For example, **SMS** was **designed** for **hearing-impaired people** before it became a mainstream technology.
- Hence, **designing** for **accessibility** **inherently results** in **inclusive design** for all.
- **Accessibility** can be **achieved** in **two ways**:
 - first, through the **inclusive design of technology**, and
 - second, through the **design of assistive technology**.

Accessibility and Inclusiveness

- When **designing for accessibility**, it is **crucial to understand the types of impairments** that **can lead to disability** as they come in many forms.
- They are often classified by the type of impairment, for example:
 - **Sensory impairment** (such as loss of vision or hearing)
 - **Physical impairment** (having loss of functions to one or more parts of the body, for example, after a stroke or spinal cord injury)
 - **Cognitive** (for instance, learning impairment or loss of memory/cognitive function due to old age or a condition such as Alzheimer's disease)

Accessibility and Inclusiveness

- Within each type is a complex mix of people and capabilities.
- For example, a person might have only peripheral vision, be colour blind, or have no light perception (and be registered blind).
- **All are forms of visual impairment, and all require different design approaches.**
- **Colour blindness** can be **overcome** by an **inclusive design approach**.
- **Designers** can **choose colours** that will **appear as separate colours** to everyone.
- However, **peripheral vision loss** or **complete blindness** will often need an **assistive technology to be designed**.
- As people age, their functional abilities diminish

Accessibility and Inclusiveness

- **Most current HCI research into disability explores** how new technologies, such as **IoT, wearables, and virtual reality**, can be **used to improve** upon **existing assistive technologies**.
- Aimee Mullens is an athlete, actor, and fashion model who has shown how prosthetics can be designed to move beyond being purely functional (and often ugly) to being desirable and highly fashionable.

Usability and User Experience Goals

- Part of the process of understanding users is to be clear about the **primary objective of developing an interactive product** for them.
 - Is it to **design an efficient system** that will allow them to be **highly productive** in their work?
 - Is it to **design a learning tool** that will be **challenging and motivating**? Or, is it something else?
- To assist in identifying the objectives, it is suggested that they be classified in terms of **usability** and **user experience goals**.
- **Conventionally**, **usability goals** are focused on meeting certain **usability criteria**, such as **efficiency**, whereas **user experience goals** are focused on **explaining the nature of the user experience**, for instance, to be **aesthetically pleasing**.

Usability and User Experience Goals

- Important thing to note is that the distinction between the two types of goals is not clear-cut since
 - **usability** is often **central to the quality** of the **user experience** and,
 - **conversely**, aspects of the **user experience**, such as how it **feels and looks**, are **intimately linked** with **how usable the product is**.
- The distinction is clarified to stress the importance of considering them together when designing for a user experience.
- Previously HCI was focused mainly with usability, but has since focused on **understanding, designing for, and evaluating** a wider range of **user experience aspects**.

Usability Goals

- **Usability** means to ensure that **interactive products** are **easy to learn**, **effective to use**, and **enjoyable** from the **user's perspective**.
- It **involves enhancing** the **interactions people** have with **interactive products** to enable them **to carry out their activities** at work, at school, and in their everyday lives.
- More specifically, usability is broken down into the following six goals:
 - Effective to use (**effectiveness**)
 - Efficient to use (**efficiency**)
 - Safe to use (**safety**)
 - Having good utility (**utility**)
 - Easy to learn (**learnability**)
 - Easy to remember how to use (**memorability**)

Usability Goals

- **Usability goals** are usually **operationalized** as **questions**.
- This gives an interaction designer a **concrete means of assessing various aspects** of an **interactive product** and the **user experience**.
- **In answering the questions**, designers can **be alerted very early on potential design problems** and **conflicts** that they might **not have considered**.
- However, simply asking **“Is the system easy to learn?”** is not going to be very helpful.

Usability Goals

- Asking about the usability of a product in a more detailed way—for example,
 - “**How long** will it take a user to figure out how to use the most basic functions for a new smartwatch;
 - **how much can they capitalize on from their prior experience**; and
 - **how long would it take the user to learn the whole set of functions?”—will elicit far more information.**
- The following are descriptions of the usability goals and a question for each one:

Usability Goals

- **Effectiveness** is a general goal, and it refers to **how good a product is at doing what it is supposed to do.**
- **Question:** Is the product capable of allowing people to learn, carry out their work efficiently, **access the information that they need**, or buy the goods that they want?
- **Efficiency** refers to the way a **product supports users in carrying out their tasks.**
- **Question:** Once users have learned how to use a product to carry out their tasks, **can they sustain a high level of productivity?**
 - The **marble answering machine** was considered efficient in that it let the user carry out common tasks, for example, listening to messages, through a minimal number of steps.
 - **In contrast, the voice-mail system** was considered inefficient because it required the user to carry out many steps and learn an arbitrary set of sequences for the same common task.

Usability Goals

- This implies that **an efficient way of supporting common tasks** is to **let the user use single button or key presses**.
- **An example** of where this kind of efficiency mechanism has been **employed effectively is in online shopping**.
- Once users have **entered all of the necessary personal details** in an online form to make a purchase, **they can let the website save all of their personal details**.
- Then, **if they want to make another purchase at that site, they don't have to re-enter all of their personal details**.
- A highly successful mechanism patented by Amazon.com is the one-click option, which requires users to click only a single button when they want to make another purchase.

Usability Goals

- **Safety** involves **protecting the user** from **dangerous conditions** and **undesirable situations**.
- **Question:** What is the **range of errors** that are **possible using the product**, and **what measures** are there to **permit users to recover easily** from them?
- In relation to the **first ergonomic aspect**, it refers to the **external conditions** where people work.
- The **second aspect** refers to **helping any kind of user** in any kind of situation to **avoid the dangers of carrying out unwanted actions accidentally**.
- It also **refers to the perceived fears** that users might have of the consequences of **making errors** and **how this affects their behaviour**.

Usability Goals

- Making interactive products safer in this sense involves
 - (1) **preventing the user** from **making serious errors** by **reducing the risk of wrong keys/buttons** being **mistakenly activated** (an example is not placing the **quit or delete-file command** right next to the save command on a menu) and
 - (2) **providing users** with various means of **recovery should they make errors**, such as an **undo function**.
- **Safe interactive systems** should **engender confidence** and **allow the user the opportunity to explore the interface to try new operations**.
- **Another safety mechanism** is **confirming dialog boxes** that **give users another chance to consider their intentions** (an example is the **appearance of a dialog box after issuing the command to delete everything in the trash, saying: “Are you sure you want to remove the items in the Trash permanently?”**)

Usability Goals

- **Utility** refers to the **extent to which the product provides the right kind of functionality** so that **users can do what they need or want to do**.
- **Question:** Does the **product provide an appropriate set of functions** that will **enable users to carry out all of their tasks in the way they want to do them**?
- **An example** of a product with high utility is an accounting software package that provides a powerful computational tool that accountants can use to work out tax returns.

Usability Goals

- **Learnability** refers to **how easy a system is to learn to use**.
- **Question: Is it possible for the user to work out how to use the product by exploring the interface and trying certain actions?** How hard will it be to learn the whole set of functions in this way?
- People don't like spending a long time learning how to use a system.
- They want **to get started right away** and become **competent at carrying out tasks without too much effort**.
- This is **especially true** for **interactive products intended for everyday use** (for example social media, email, or a GPS) and **those used only infrequently** (for instance, online tax forms).

Usability Goals

- To a certain extent, people are prepared to spend a longer time **learning more complex systems** that **provide a wider range of functionality**, such as web authoring tools.
- In these situations, **pop-up tutorials** can help by providing contextualized **step-by-step material** with hands-on exercises.
- A key concern is determining how much time **users are prepared** to spend learning a product.
- It seems like a waste **if a product provides a range of functionality** that the majority of users are **unable or unprepared to spend** the time learning how to use.

Usability Goals

- **Memorability** refers to how easy a product is **to remember how to use**, once learned.
- **Question: What types of interface support** have been provided to help users remember how to carry out tasks, especially for products and operations they use infrequently?
- Users shouldn't have to keep relearning how to carry out tasks.
- **Unfortunately, this tends to happen when the operations required** to be learned are **obscure, illogical, or poorly sequenced**.

Usability Goals

- **Users can be helped to remember** the **sequence of operations** at different stages of a task through **contextualized icons**, **meaningful command names**, and **menu options**.
- **Structuring options and icons** so that they are **placed in relevant categories** of options.
- In addition to **couching usability goals** in terms of specific questions, they are turned into **usability criteria**.
- These are **specific objectives** that **enable the usability** of a *product to be assessed* in terms of **how it can improve or not improve a user's performance**.

Usability Goals

- Commonly used **usability criteria** are time to complete a task (**efficiency**), time to learn a task (**learnability**), and the number of errors made when carrying out a given task over time (**memorability**).
- These can **provide quantitative indicators** of the **extent to which productivity** has **increased**, or **how work, training, or learning have been improved**.
- **However, they do not address the overall quality of the user experience**, which is where user experience goals come into play.

User Experience Goals

- A **diversity** of **user experience goals** has been articulated in interaction design, which covers a **range of emotions** and **felt experiences**.
- These are **subjective qualities** and are **concerned with how a system feels to a user**.
- **They differ** from the **more objective usability goals** in that they are concerned with **how users experience an interactive product from their perspective**, rather than **assessing how useful or productive a system is from its own perspective**.

Design Principles

- Design principles are used by interaction designers to **aid their thinking** when designing **for the user experience**.
- These are **generalizable concepts intended to orient designers** toward thinking about different aspects of their designs.
- A well-known example is **feedback**: **products should be** designed to provide **adequate feedback** to the users **that informs them about** what has already been done **so that they know what to do next in the interface**.
- Another one that is important is **findability** (Morville, 2005), **the degree to which** a **particular object is easy to discover or locate**, be it **navigating a website**, **moving through a building**, or finding the **delete image option** on a **digital camera**.

Design Principles

- Related to this is the principle of **navigability**: **Is it obvious what to do** and **where to go in an interface**; **are the menus structured in a way that allows the user to move smoothly through them to reach the option they want?**
- **Design principles** are **derived from a mix of theory-based knowledge, experience,** and **common sense.**
- They tend to be **written in a prescriptive manner**, suggesting to designers **what to provide** and **what to avoid at the interface**, the **dos** and **don'ts** of interaction design.

Design Principles

- However, they are not intended to specify how to design an actual interface, for instance,
 - telling the designer how to design a particular icon or how to structure a web portal,
 - but to act more like triggers for designers, ensuring that they provide certain features in an interface.
- Several **design principles** have **been promoted**, the **best known** are concerned with **how to determine what users should see** and **do when carrying out their tasks** using an interactive product.
- The most common ones are briefly described: **visibility, feedback, constraints, consistency, and affordance.**

Design Principles: Visibility

- The **more visible functions are**, the more likely it is that users **will be able to know what to do next.**
- Don Norman (1988) describes the controls of a car can be done to emphasize this point.
- The **controls for different operations** are **clearly visible**, such as indicators, headlights, horn, and hazard warning lights, indicating what can be done.
- The **relationship between the way the controls have been positioned** in the car and **what they do makes it easy** for the driver **to find the appropriate control** for the task at hand.

Design Principles: Visibility

- In contrast, when **functions are out of sight**, it makes them **more difficult to find** and **to know how to use**.
- For example, devices and environments that have become automated through the use of sensor technology, like faucets, elevators, and light, can sometimes be more **difficult for people to know how to control**, especially **how to activate or deactivate them**.
- This can result in people getting stuck and frustrated.
- [Visibility - Design Principles - General Design Principles & Guidelines - The University of Texas Health Science Center at Houston \(UTHealth\) School of Biomedical Informatics](#)

Design Principles: Feedback

- Related to the concept of **visibility** is **feedback**, **best illustrated** by an **analogy to what everyday life would be like without it**.
- Imagine trying to play a guitar, slice bread using a knife, or write using a pen if none of the actions produced any effect for several seconds.
- **Feedback involves sending back information about what action has been done and what has been accomplished, allowing the person to continue with the activity.**
- **Various kinds of feedback are available** for interaction design, **audio, tactile, verbal, visual**, and **combinations of these**.

Design Principles: Feedback

- The key is deciding **which combinations are appropriate** for different types of **activities and interactivities**.
- Using feedback in the right way can also provide the necessary visibility for user interaction.
- [Feedback - Design Principles - General Design Principles & Guidelines - The University of Texas Health Science Center at Houston \(UTHealth\) School of Biomedical Informatics](#)

Design Principles: Constraints

- The design concept of constraining refers **to determining ways of restricting the kinds of user interaction that can take place at a given moment.**
- There are **various ways** to achieve this:
 - A common design practice in graphical user interfaces is **to deactivate certain menu options** by **shading them grey**, thereby **restricting the user only to actions permissible at that stage** of the activity.
 - One of the advantages of this form of constraining is that **it prevents the user from selecting incorrect options** and thereby **reduces the chance of making a mistake.**
 - The use of different kinds of **graphical representations** can also **constrain a person's interpretation** of a **problem or information space.**
 - For example, **flow chart diagrams** show **which objects are related to which**, thereby **constraining the way that the information can be perceived.**

Design Principles: Constraints

- The **physical design of a device** can also **constrain how it is used**;
- for example, **the external slots** in a computer have been **designed to allow a cable** or **card to be inserted in a certain way only**.

Design Principles: Consistency

- This refers to **designing interfaces** to have **similar operations** and **use similar elements** for achieving **similar tasks**.
- In particular, **a consistent interface is one that follows rules**, such as **using the same operation to select all objects**.
- For example, a **consistent operation** is **using the same input action to highlight any graphical object on the interface**, such as **always clicking the left mouse button**.
- **Inconsistent interfaces**, on the other hand, **allow exceptions to a rule**.
- [7 Tips for Designing Consistency | Design Shack](#)

Design Principles: Consistency

- One of the benefits of **consistent interfaces**, therefore, **is that they are easier to learn and use.**
- Users have to learn only a single mode of operation that is applicable to all objects.
- This principle works well for simple interfaces with limited operations, one with a small number of operations mapped onto separate buttons.
- **A much more effective design solution for maintaining consistency in a large application is to create categories of commands that can be mapped into subsets of operations that can be displayed at the interface, for instance, via menus.**
- [Principle of Consistency and Standards in User Interface Design \(interaction-design.org\)](http://interaction-design.org)

Design Principles: Affordance

- This is a term used to refer **to an attribute of an object that allows people to know how to use it.**
- For example, a mouse button **invites pushing** (in so doing, activating clicking) **by the way it is physically constrained in its plastic shell.**
- At a simple level, **to afford** means **“to give a clue”** (Norman, 1988).
- When **the affordances of a physical object** are **perceptually obvious**, **it is easy to know how to interact with it.**
- For example, a door handle **affords pulling**, a cup handle **affords grasping**, and a mouse button **affords pushing.**

Design Principles: Affordance

- The term has since been much **popularized** in interaction design, **being used to describe how interfaces should make it obvious** as to what can be done when using them.
- Don Norman (1999) suggests that there are **two kinds of affordance: perceived and real**.
- **Physical objects** are said to have **real affordances**, like grasping, that are perceptually obvious and do not have to be learned.
- **In contrast, user interfaces** that are **screen-based are virtual** and **do not have these kinds of real affordances**.
- [6 Types of Digital Affordance That Impact Your UX | Webdesigner Depot Webdesigner Depot » Blog Archive](#)

Design Principles: Affordance

- Using this distinction, he argues that it does not make sense **to try to design for real affordances at the interface**, except **when designing physical devices**, like **control consoles**, where **affordances** like **pulling and pressing** are **helpful in guiding the user to know what to do**.
- Alternatively, **screen-based interfaces** are **better conceptualized as perceived affordances**, which are **essentially learned conventions**.
- However, watching a one-year-old swiping smartphone screens, zooming in and out on images with their finger and thumb, and touching menu options suggests that kind of learning comes naturally.

Applying Design Principles in Practice

- One of the challenges of applying more than one of the design principles in interaction design is **that trade-offs can arise** among them.
- For example, the more one tries to **constrain an interface**, the **less visible** information becomes.
- The same can also happen when **trying to apply a single design principle**.
- For example, the more an interface is designed **to afford** through trying to resemble the way physical objects look, the more it can become cluttered and difficult to use.
- It can also be the case that the **more an interface is designed to be aesthetic**, **the less usable it becomes**.

Applying Design Principles in Practice

- **Consistency** can be a **problematic design principle**; trying to design an interface to **be consistent with something** can make it **inconsistent with something else**.
- Furthermore, sometimes **inconsistent interfaces** **are actually easier to use than consistent interfaces**.