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DIGITAL EXPRESSION

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Digital Expression

About this eBook

Digital Expression

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Edith Lozano ▪ Octavio Muñoz ▪ Roberto Sobrado

Tecnológico de Monterrey is proud to present its collection of eBooks for high school, undergraduate, and graduate levels. Every book contains knowledge and skills that use various technologies to support learning.

The main objective of this signature is to spread the knowledge and teaching experience of faculty at Tecnológico de Monterrey through innovative resources. It also aims to contribute to the development of a publishing model that integrates the eBook format with the many possibilities that digital technologies offer.

Along with Editorial Digital, Tecnológico de Monterrey reaffirms its entrepreneurial vocation, and its commitment to educational and technological innovation, for the benefit of learning both inside and outside of Tecnológico de Monterrey.

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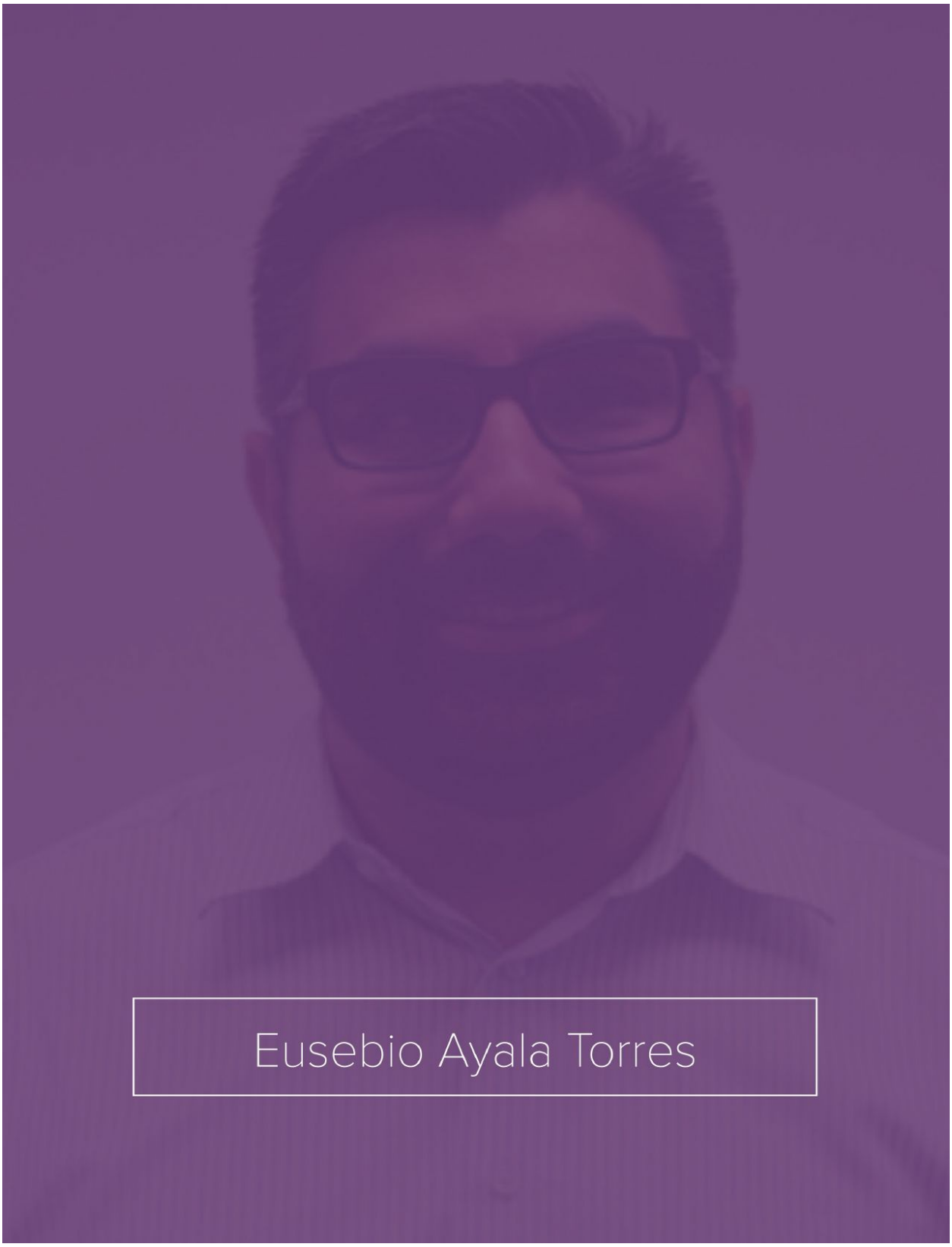
About the Authors

Tap below to watch the welcome video.



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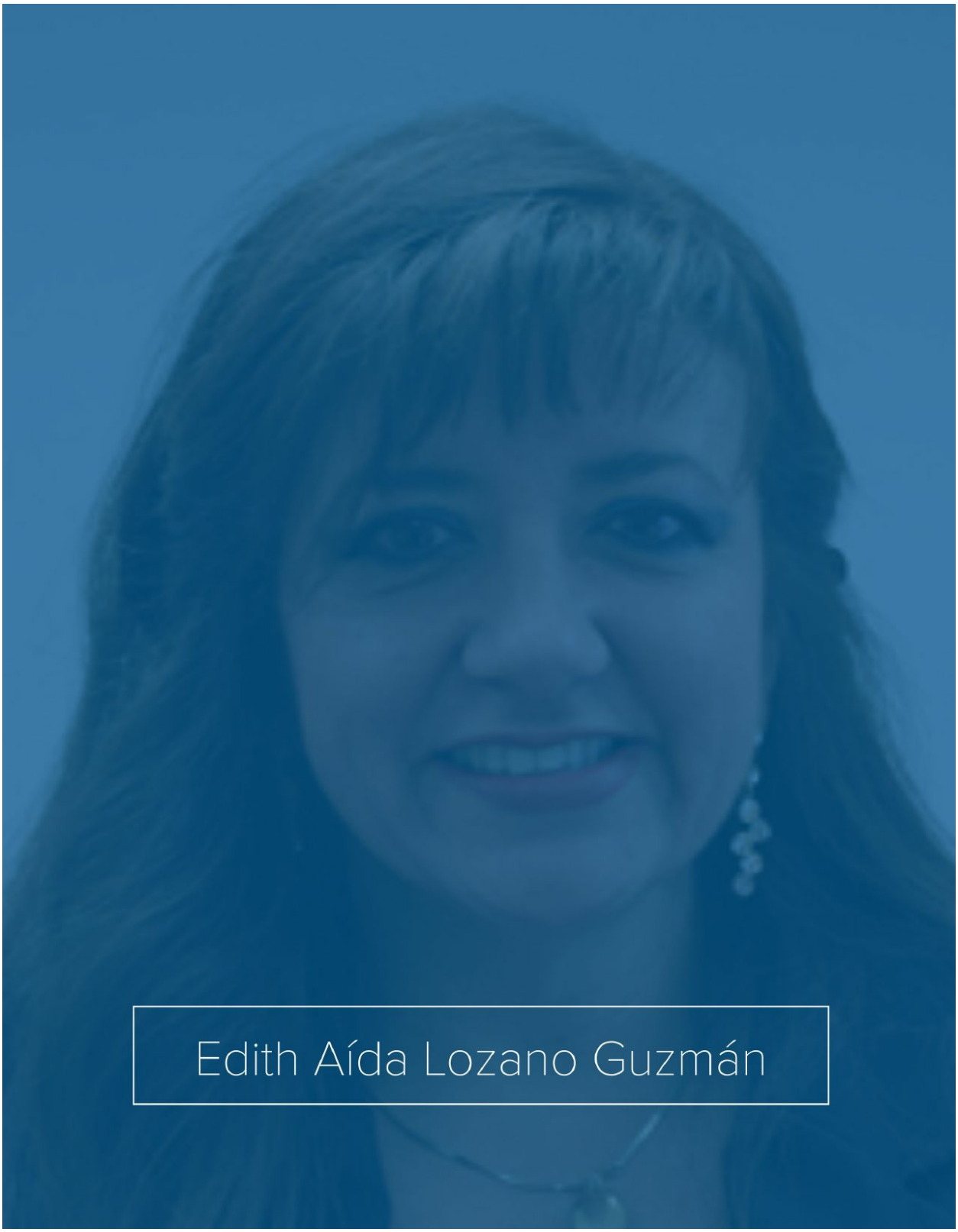
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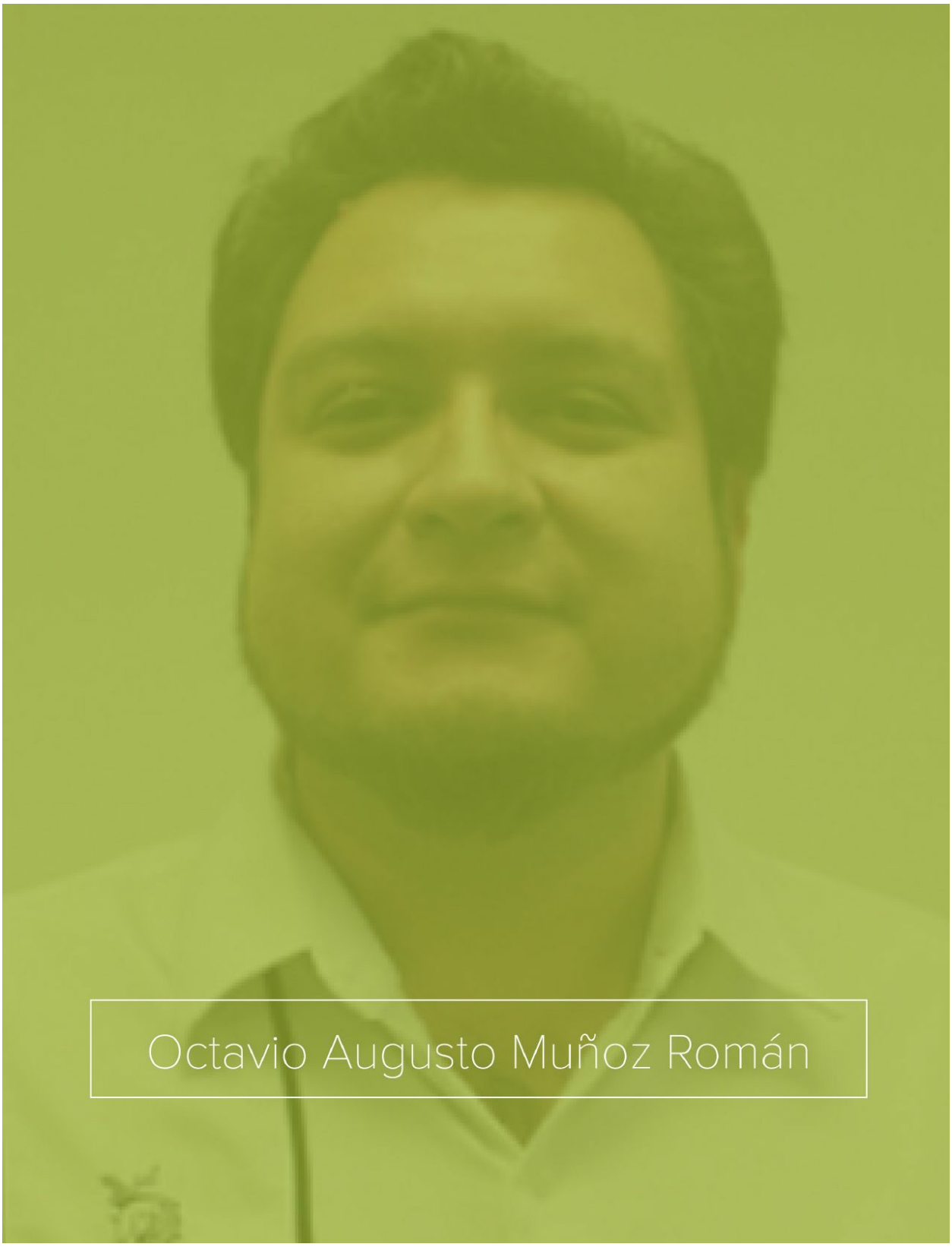
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He has worked as collaborative tools coordinator, and as an application developer for the Computer Science Directorate at the Estado de México Campus.

He has taught the following high school courses: Introduction to Information Technologies, Development of Multimedia Applications, and Math I, II and III. In 2001 he received the Quality Work Award.

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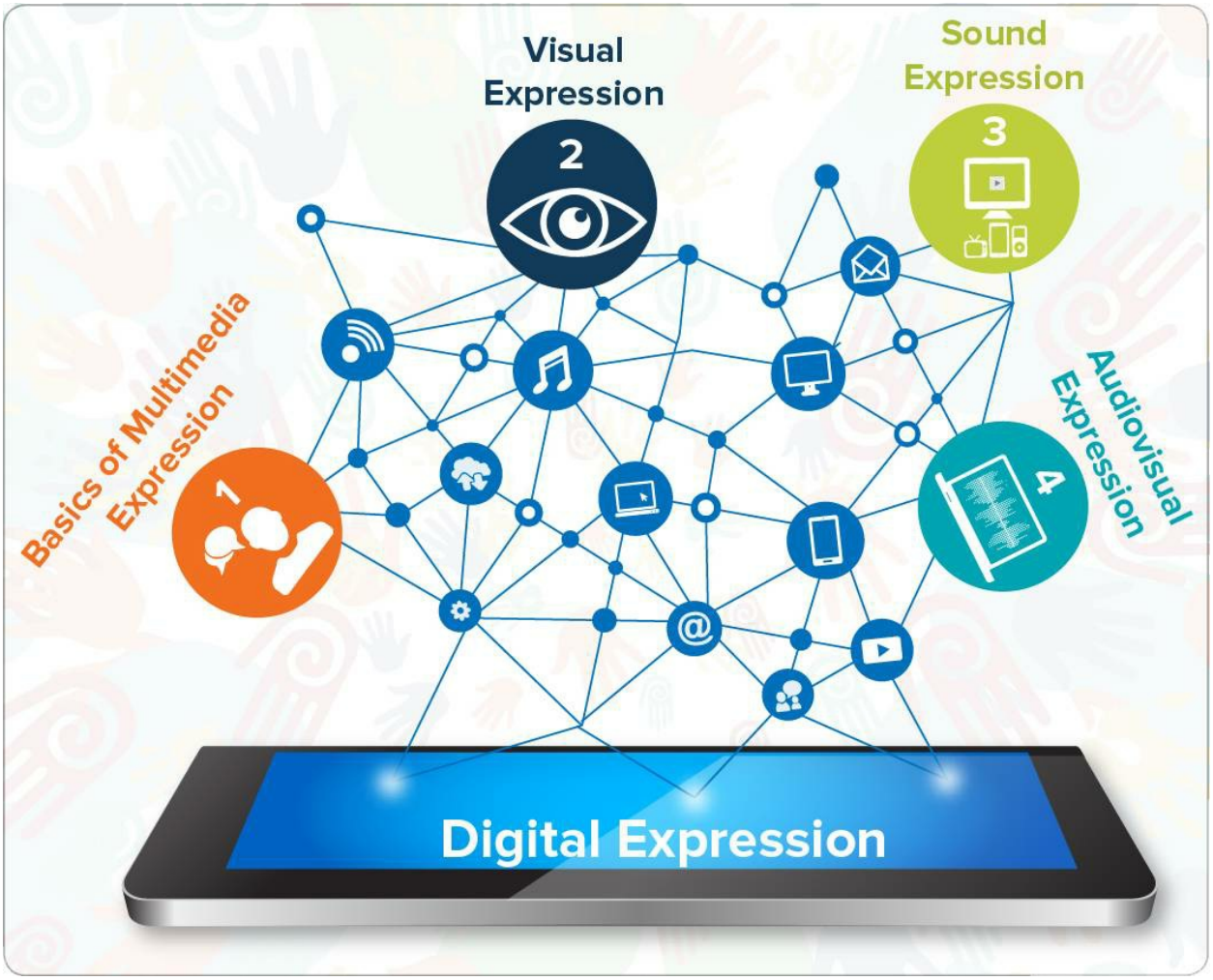
Content Map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Introduction

The technology within our reach allows us to communicate in any number of ways. This eBook provides a base in which you can take full advantage of available digital media to create multimedia content that includes text, voice, sound, image, animation, and video. The aim is to increase your opportunities for creative expression.

First, this work addresses the basics of multimedia expression by identifying the characteristics of each of its possible elements from different perspectives, such as communication, design, perception, and cognitive psychology.

The second chapter emphasizes the importance of image creation, design, and use. This, consequently, requires knowledge of color palettes, file codification, and the basic manipulation tools used for photographs, graphics, or drawings.

The third chapter highlights the importance of sound and how the audience perceives it. For this reason, we review the differences, similarities, and ways analog and digital audio formats are used.

We consolidate the topics covered in the fourth chapter. The design and development of an audiovisual work in video format is proposed using a standard methodology that ranges from the creation of a script to its production.

The key multimedia concepts shown here will develop your digital and communication competencies. You will create important products intended for a specific audience, and they will be statements that convey creative, innovative, and ethical messages and emotions.

Chapter 1 | Basics of Multimedia Expression

"It is the supreme art of the teacher to awaken joy in creative expression and knowledge."

—Albert Einstein

Introduction

The message you are reading is shaped like a book, but contains elements such as videos, images, and sounds. The information you will find in this book has been structured to provide you with knowledge that you will later apply on your own. This eBook is a form of **multimedia expression** especially designed for anyone who is looking to deliver compelling messages using today's information and communication technology.

In this chapter, you will see that recognizing the different parts of the process of communication is a necessary part of delivering a rich message that benefits from multimedia elements.

New technolgy and the widespread availability of different media have changed the way we communicate. For example, today's job market is full of new professions such as ***community manager***, ***digital media developer***, and ***digital designer***.

Did you know that many of today's toys have more electronic circuits than *Sputnik*, the Soviet satellite launched in 1957? Other common consumer products available today are driverless cars, fully-immersive virtual reality headsets, and multimedia and **biometric watches** that can connect to smartphones. All are signs of **digital convergence**, a term that describes the way different industries and specialties interact to create new and innovative products. From this perspective, innovation can be defined as applied creativity, because it relies on multidisciplinary knowledge to create products that offer added value.

So when we talk about multimedia expression, we speak of a combination of text, art, sound, animation, and video, which can be viewed on a computer or another device. For example, millions of pages on the World Wide Web use some or all of these elements. It has all been possible thanks to communication hardware development, broadband networks, improvements in server technology, and widespread access to computers.

Did you know…?

The *Internet Archive* is a digital library where you can explore the Internet's history from the very beginning. You can also find academic and cultural film collections, cartoons, short films, and videos. Click here *to visit them.*

The more senses you engage, the more communication channels you open. Multimedia elements are often an active combination of sight, hearing, and touch that create a sort of festival for the senses: there are lights, faces, smiles, voices, images, music, expressions, and interaction among users who are present at one time. These expressions involve a variety of communication channels that enrich interaction between different people, between readers and content, between presentations and observers, between programs and users, and also between messages and receivers.

The word **multimedia** implies that given product is the outcome of several forms of communication and technology converging. It didn't happen spontaneously. It happened as a result of continuously learning to express our thoughts and beliefs through speech, writing, theatre, music, dance, painting, photography, images, graphic design, film, television, and computer use.

This is where our communication skills converge with our ability to use technology in the search for greater ways to express ourselves.

1.1 Multimedia Expressions and Applications

In the recent past, many kinds of content were available in the form of CD-ROM *software.* Back then, you could find recipes, interior design programs, furniture catalogs, expense management software, photographic databases, family videos, books, and telephone directories on CD format.

Anything delivered on CD or DVD-ROM was considered **offline** content. While some products are still available in this format, changes in the market have shifted distribution to an **online** format, which means that you can buy and download products from the Web without requiring a physical object. Online shops such as Google Play Store, the App Store, or Apple's iTunes, as well as Microsoft e-commerce, can deliver content through apps available on computers or smartphones.

However, access to online multimedia content has entered a new phase thanks to the Cloud—the latest paradigm in distribution. Now you can access applications direct from their servers as a subscriber without having to download anything. Instead, they run on any device with an Internet connection. Microsoft Office 365, Apple iWork, and Google Plus are examples of platforms where you can generate and share multimedia content.

Other devices, such as televisions, can also display multimedia content through DVDs (digital versatile discs) and Blu-ray players, through digital channels, and through video game consoles such as PlayStation, Xbox, or Wii, which also enable you to play online games with people around the world.

On the other hand, digital phones equipped for messaging and video calls are rapidly replacing traditional analog telephones. Above all, cellular phone technology is still spreading, and greater data capacity has meant that devices can feature digital cameras, ringtones, Internet connections, online banking, online billing, and the ability to connect with other devices through an infrared technology known as **Bluetooth.**

Refrigerators and other goods are now fitted with **LED** flat screens and other technology such as radio, television, and Internet reception. However, many of these products are still expensive and only high-income families can afford them.

Multimedia applications are also relevant in business environments. These include product and service presentations, advertising, marketing, databases, product catalogs, staff training, and business communication networks that support text, audio, and video messaging.

If you tailor your presentations to suit your audience, your multimedia elements will become compelling and persuasive on more than one channel. Advertising and marketing are important areas where you can use these resources, but be sure to evaluate other aspects such as hardware, software, target audience, message, and how and where you will be launching your multimedia work.

Web sites, **e-cards**, and mass media advertising campaigns are typical examples of multimedia use, but there are other online models where advertising reaches users through free apps. In this case, users can pay to get rid of ads.

Today, multimedia catalogs showcase products for online stores. They have played an important role in the growing influence of e-commerce on the global economy. When you design a catalog, make sure you understand the nature of the catalog and set clear communication goals. In professional and interactive design, the use of electronic media can boost your creativity and reduce the time it takes to deliver a product. Business databases are a good way to manage and present company information that matches the needs of a given audience (suppliers, employees, distributors, and clients).

The training industry has shown growing interest in **e-learning**, which uses technology to enrich training materials. You can now find highly specialized training software for pilots, nurses, mechanics, and many other trades and professions. Staff can use technology to develop their skills and resources.

Multimedia education can be used to create learning environments through **integration**, **narrative**, **interactivity**, and **immersion.** These elements offer new ways to provide information according to people's specific preferences in text, audio, or video. Narrative sequence and content

structure have become moveable parts; interactivity helps users relate to selected content through simulation and immersion, which add a sense of reality to their experience while remaining in a controlled environment.

As a result of changes in the use of technology, teachers' roles in the classroom have been dramatically transformed. Students have a better grasp of information and concepts and are skilled with new resources that allow for more efficient learning.

Teaching methods are changing. New active methods that offer students a chance to experiment, for example, creating multimedia content, are taking the place of the old knowledge transmission methods from the past. Teachers can now monitor the way their students structure information and evaluate their ability to establish connections and understand the content.

Entertainment is business, and many tech companies know it. The market is full of liquid crystal screens, video game consoles, multimedia cell phones, personal digital assistants, music players, portable video devices, and other **gadgets** and **gizmos** with apps that have been designed to make use of all their available functions.

A quick look at today's devices shows how far technology may take us. There are digital televisions and gadgets such as AppleTV, Google Chromecast, Apple Watch, Google Glass, drones, 3-D headsets, immersive headsets like Oculus Rift, and many other devices.

Did you know…?

You can create models on a 3-D HMD (*head-mounted display*)

headset? Click here *to see how it works.*

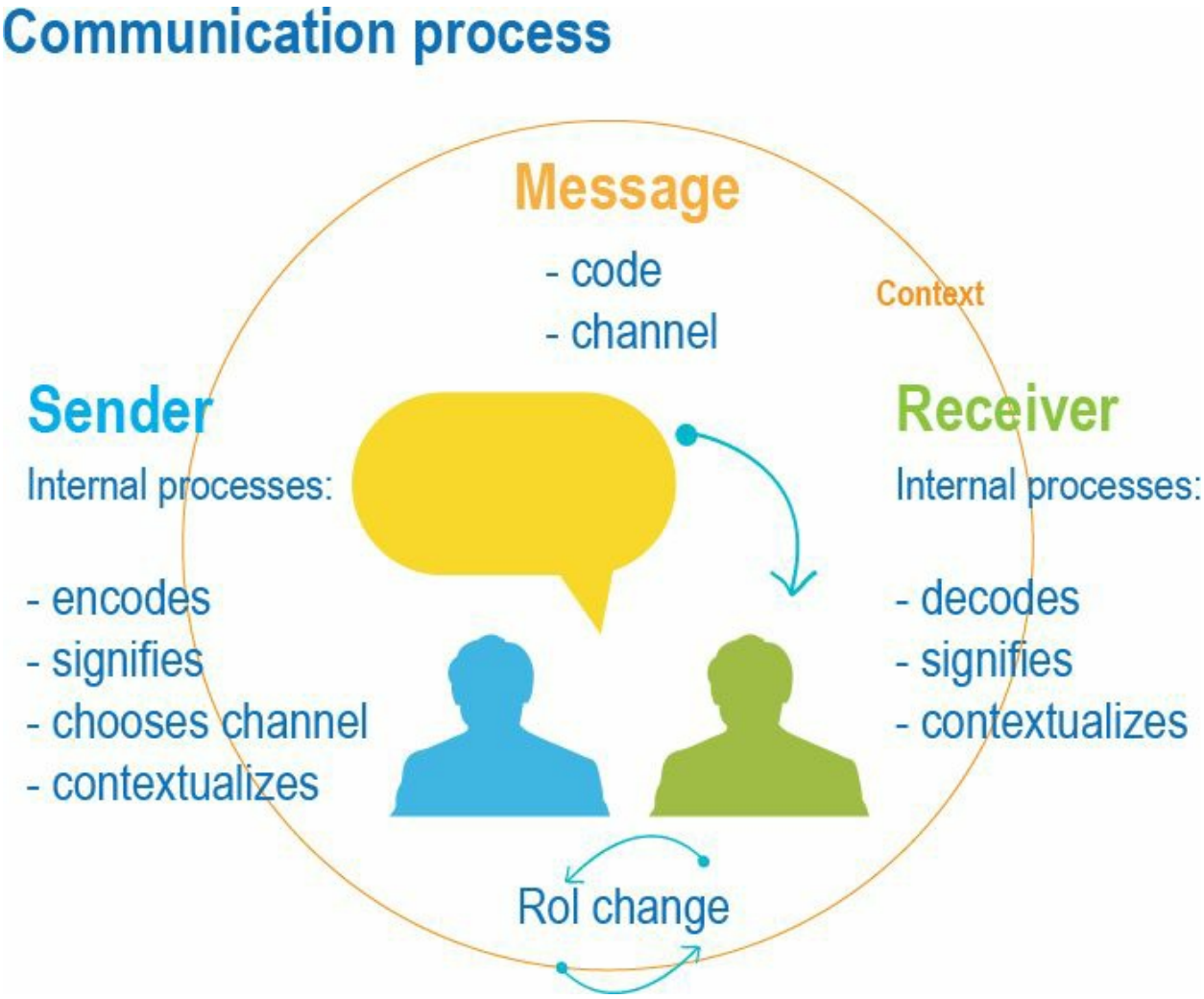
1.2 Multimedia Expressions in the Communication Process

You may have noticed how we've mentioned two different terms using the word expression (multimedia expression and **digital expression**). According to the *Oxford Dictionary*, an expression is "A word or phrase, especially an idiomatic one, used to convey an idea." This word is also related to the act of communicating, which happens when you "Share or exchange information, news, or ideas" (*Oxford Dictionary*, 2016).

Communication is a way of sharing with others. In other words, our expressions deliver a message to someone else. Let's review the basic elements involved in the **communication process**:

1. **transmitter:** The person who creates and sends an encoded message,
2. **message:** Encoded information that is sent through a communication channel,
3. **receiver:** the person who receives and decodes the message,
4. **channel:** the medium through which the message is transmitted.

In this eBook, we will focus on how to design messages for delivery through multimedia communication channels that rely on digital technology.



Graphic 1.1 Elements of the communication process.

In communication through multimedia expressions, the transmitter designs the message in a format that can include sound, images, text, animations, and video to provide an interface that favors interaction with the receiver. Environments supported by digital media are known as **user interfaces.**

Don't forget that communication is a two-way process where roles are eventually reversed, making the transmitter the receiver and vice-versa. This part of the transaction is known as feedback.

Did you know…?

Theatre was once an experimental space for what we now call multimedia communication.

Visit the American Theatre Wing to learn more about the way resources, such as aerial choreography, are currently used on stage.

Transmitters should design messages that meet their objectives and have the receiver in mind. If you create a video game, for example, you should consider the people who will be playing it: their age, culture, education, interests, geographic location, income, necessary hardware (VR headset, gloves, or movement sensors), etc.

Many inventions throughout history have allowed us to communicate in person or from a distance, through sight, sound, touch, taste, or even smell. This eBook talks about the importance of **visual expressions** (text, image, drawing, and color), **sound expressions** (audio), and the combination of both (multimedia expressions). The term **digital expression** is used to highlight expressions or messages delivered in an electronic format that can be stored, transmitted, or reproduced on any digital device.

Multimedia expressions are "a combination of text, audio, video, and animation that transmit information, ideas, concepts, processes, or products in a creative and original work that can only be displayed on digital technology" (Gil y Rosas, 2010). These works can be viewed on two kinds of devices: **asymmetric** or **symmetric** media.

1. Asymmetric media: In asymmetric media, information flows one way. When the message reaches the receiver, they have no way of providing feedback over the same channel. Such is the case with books, databases, online newspapers, and multimedia presentations, to name a few examples.
2. Symmetric media: Symmetric media offer two-way channels between the transmitter and the receiver. Typical examples are phones, email, instant messages, blogs, wikis, social media, and collaborative file-sharing platforms.

In the communication process, the content is in the message: it conveys what the transmitter wishes to say, express, inform, present, show, convince, warn, persuade, teach, or divulge. In short, it's what you intend to communicate. This goal is the base that will mold the information or story you're trying to tell. Throughout this book, we will continually refer to multimedia expression as a goal that can be reached through a combination of elements.

Choosing a theme and the best way to deliver it will depend on the designer's intentions. After identifying your objective and any relevant information, the next step is getting to know the audience and designing the message. If you're an artist who wishes to express through art as a way to spark debate, or as social critique, or as a way of promoting your values and worldviews, you will look for a particular kind of person who can help you do it.

For different reasons, everyone has communication needs—from advertisers, educators, and businesses, to government authorities and social organizations. Knowing your target audiences is one of the keys to choosing the best way to approach a subject. Important decisions such as production and distribution methods and the type of multimedia project in question are aspects that you should consider when structuring your message. How you access the message, and the technology it requires, will also affect your choices and the final product.

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An important aspect to consider, which we will only mention briefly, is the legal implication of using any copyrighted element (image, text, video, or audio) without permission. Intellectual property and copyright laws vary from one country to another, but some international agreements like the Vienna Convention regulate intellectual property on a greater territorial scale. The World Intellectual Property Organization (WIPO) is a specialized United Nations agency dedicated to protecting creative work. In Mexico, the Ley Federal de Derecho de Autor (LFDA, or Federal Copyright Law) protects literary, artistic, and digital property. In case of doubt, verify before using any material. You should always check if any of your elements are protected by copyright or if you require legal authorization to use them. You should become familiar with legal terminologies such as **fair use**, **public domain**, and **creative commons.**

Did you know…?

If you learn more about intellectual property you will be able to deliver stronger multimedia messages. *The following books can provide more information:*

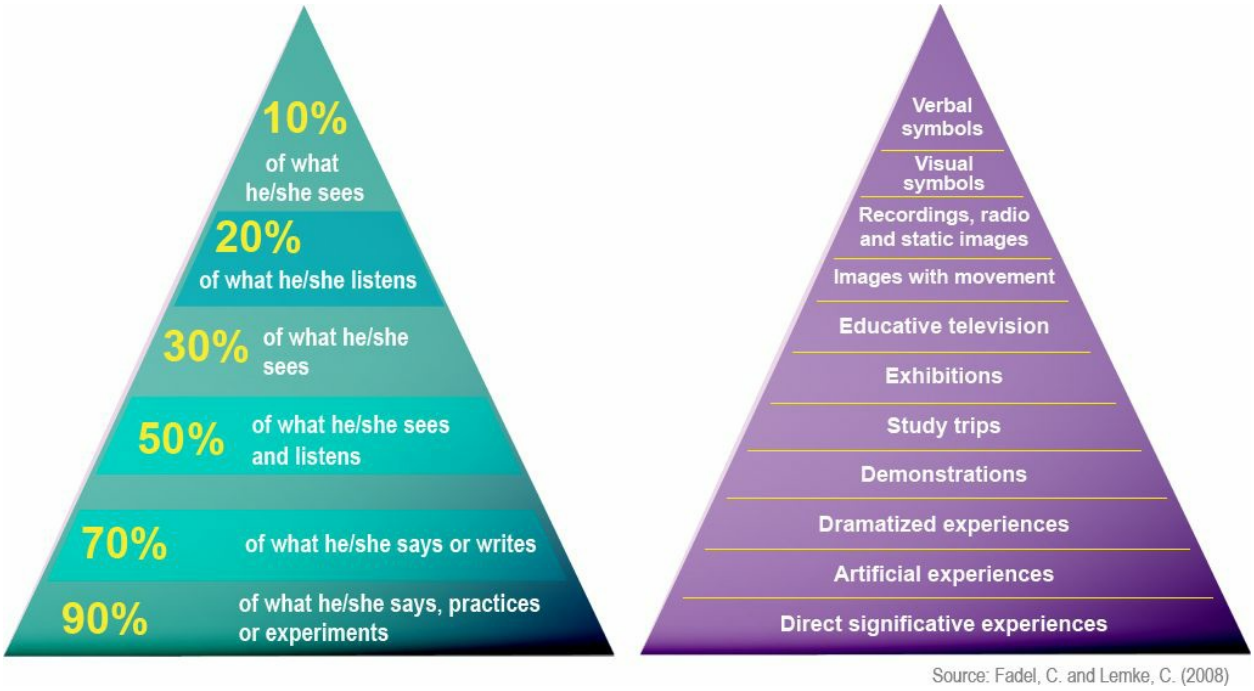
- Ayala, E. et. al. (2016). *Creativity and Digital Design.* México: Editorial Digital del Tecnológico de Monterrey.

- Gil, V, et.al. (2012). *Fundamentos de tecnologías de información: viviendo en una sociedad tecnológica. Volumen II.* México: Editorial Digital del Tecnológico de Monterrey.

1.3 Basic Multimedia Concepts

The Message as Content

A common misconception is that sound and video will automatically improve communication. In education, we have something called the myth of percentages, or the "Cone of Learning" which is a simplified version of Edgar Dale's "Cone of Experience." In his original article, Dale used this pyramid as a visual aide and as a metaphor that demonstrated how much people learn or remember and which experiences influence their knowledge the most—and he did not support his pyramid with any percentages. However, this is only a simplified way of learning that depends on how much you engage with certain contents. Images are not always better than words—depending on your objectives, the type of content, the context, and the receiver. In fact, the proliferation of quotations in texts shows that Dale's original message has been misinterpreted.



Graphic 1.2 From left to right, "The Cone of Learning" (Chi, 1989) and "The Cone of Experience" (Dale, 1954).

Recent advances in neuroscience have shown that reading promotes deep engagement between content, context, and readers. For this reason, we reviewed the elements in the

communication process earlier in this chapter, because it would be simplistic and misleading to assume that audiovisual products are always the best option. Text and audiovisual media serve different purposes, have different composition elements, and use different languages. Knowing each one will help you make the right choice.

Did you know…?

Wildscreen Arkive **is a multimedia resource for information on endangered species from around the world. Not only does it display images, videos, and descriptions of each species, it provides age-specific information for different audiences. This website relies on contributions from professional photographers and film producers, and from scientists and conservationists who are recording life on Earth.** *Navigate their web site to see how and why it is working to raise environmental awareness.*

Thought Process and Physiology of the Brain

Our appropriation of content depends on the physiology of the brain. This type of thought process is linear, which is why “multitasking” means that we are moving from one task to another over small periods of time. The more complex the task, the more we encounter delays and inconveniences.

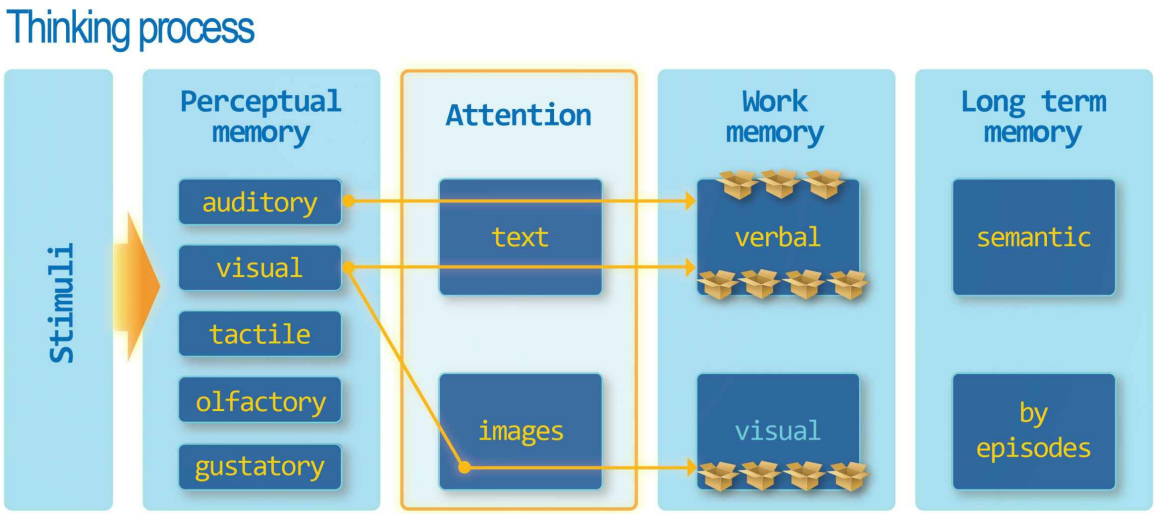
The human brain has three types of memory: **perceptual**, **working**, and **long-term memory.** Our thoughts come from our working memory, which is a two-part coding system capable of holding up to seven words and four visual or spatial elements at once.

Our working memory limits our brain's physiology. If we attempt several activities at once, our temporary storage moves continuously from one element to the next, which can make us unaware of what we are doing. This explains why so many people have accidents while talking on the phone.

In contrast, when our working memory receives words and images, and our sensory memory processes audible, verbal, visual, and spatial stimuli as one, another kind of memory, that takes in the whole experience, is activated.

Long-term memory is associated with short-term memory. Information that enters through short-term memory is the only information likely to remain. **Episodic memory** allows us to remember experiences from the past when, at a given moment, we encounter something similar again.

Therefore, episodic memory is a form of long-term memory, like semantic memory, which stores everything we actively think of through our working memory—ideas, procedures, mental models, and thoughts. Working memory is not linked to any previous experience or input captured through perceptual memory.



Graphic 1.3 Thought process: three types of memory.

When we come to an understanding of the way we perceive and process information, we can also understand that the receiver at the other end of a message may have previous knowledge or preconceived ideas about a given topic. Hence, it's important to present content that accounts for what they might know. We can then provide new information for them to add to their existing knowledge base. The extent of their appropriation will depend on the way the message is displayed and the relevance or meaning it holds for the receiver; it will also depend on how the presentation sequence is structured, taking stimuli, and thought processes (thinking, imagining, organizing, analyzing, assigning meaning) into consideration.

Interactive Multimedia and Hypermedia

In this context, multimedia projects (usually presented as projects or works) rely on text, image, audio, video, and animation to convey information, ideas, concepts, processes, or products in a creative and original manner. If a project also features interactivity, then it is considered an **interactive multimedia** product.

Interactivity is a feature that gives users control of their experience through elements and objects and enables them to explore the product's structure and sequence at their leisure. **Hypermedia** is also a relevant term, and it refers to a multimedia composition structured around elements that provide hyperlinks for the user to follow and select as they explore.

Usability and Accessibility

Usability and **accessibility** are concepts that are important in multimedia because they ensure that applications can be used by everyone and anyone, without exception. Usability is a measure of quality and can be used to determine whether the application is:

1. easily learned without the help of others,
2. a fast and efficient way of completing a task,
3. easy to pick up and use even when infrequently used,
4. intuitive and designed to minimize errors, and

5. satisfying in terms of function and interface design.

Accessibility, on the other hand, is a measure of equality that reduces the risk of discrimination by providing technological assistance to those who would typically find the application difficult to use due to vision, hearing, or mobility disabilities.

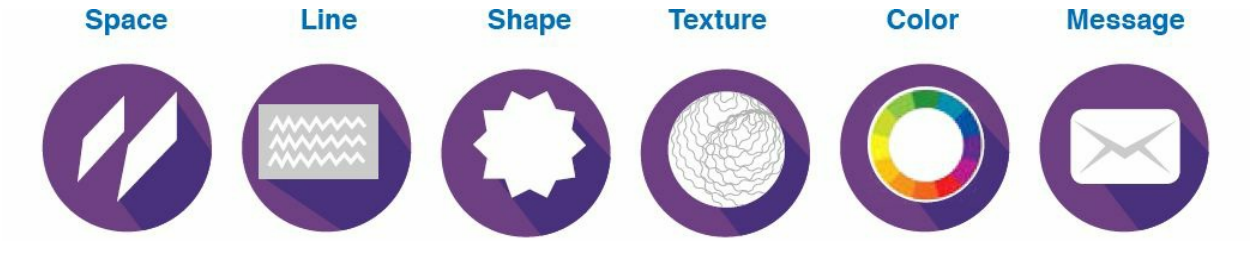
The following list, researched by Fadel, C. y Lemke, C. (2008), will help you make the most of multimedia elements:

1. Retention increases when you use two different media towards a single objective; for example using a combination of words and images.
2. Words and related images should be close to each other or adjacent on the page.
3. Texts and images should occupy adjacent and simultaneous time frames.
4. Words and images should be coherent to avoid using something irrelevant or out of context.
5. Using two types of media together is better than presenting them separately; for example, a narrated animation is more attractive than an animation accompanied by text.
6. Redundancy causes interference. Therefore, information should be integrated and contained
7. The less people know, the greater the effect of design.
8. Design will have a greater influence on those who are visual learners.
9. Users will become more involved if they can interact and control their experience.

Elements of Design and Artistic Principles

The success of a multimedia product will depend on how well it integrates its elements. Every element should be used correctly and with a sense of opportunity. Hagen and Golobksy (2013) have listed four primary functions of graphic design: capturing attention, controlling the way users' eyes scan the page or screen, conveying information, and arousing emotions. Therefore, space also becomes an element where visual components should be harmoniously organized. Good design balances form, which is connected to artistic appreciation, and function, which is a reflection of usefulness.

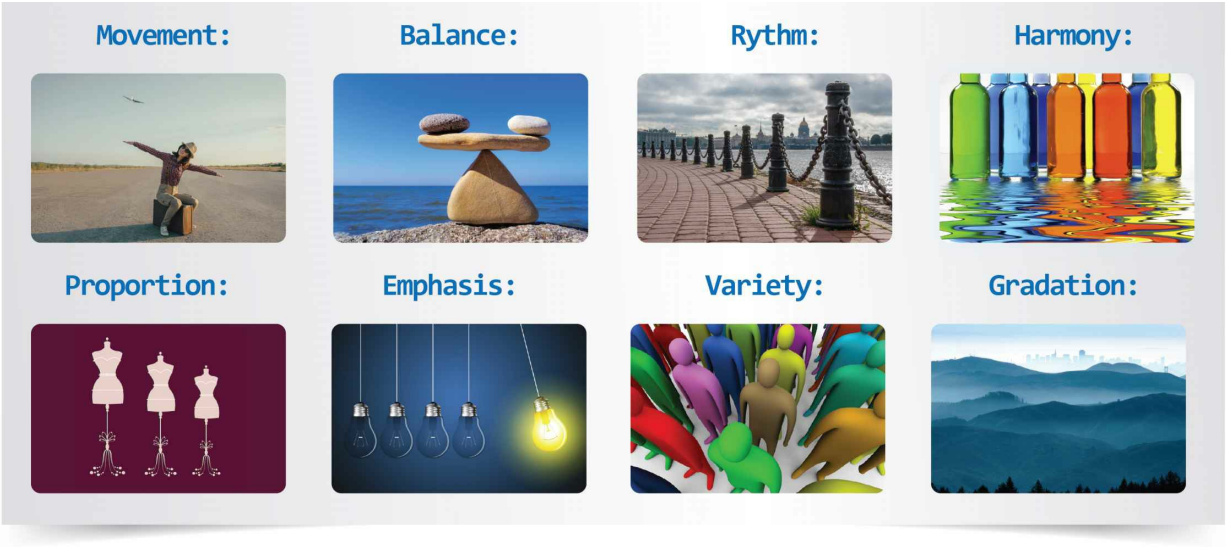
Most multimedia products respond to the **elements of design** and **artistic principles.** Look at the following images and identify each one, noticing how on an abstract level, multimedia applications are like Russian *matryoshka* dolls because they contain elements within a certain shape, which in this case would represent the user interface.



Graphic 1.4 Basic design elements for visual communication.

- **Space:** relationship of the distance among objects inside a design.
- **Line:** trace of a dot in movement.
- **Shape:** group of lines that make up a figure.

- **Texture:** visible characteristics of a shape that provoke specific sensation such as rough, smooth, soft, hard or glossy.
- **Color:** an object's attribute that represents a visual stimulus before the eyes of the observer.
- **Message:** information that is transmitted.



Graphic 1.5 Art principles.

- **Movement:** it is a composition that gives the impression that an object is not static.
- **Balance:** it is a combination of elements that provides stability to the work.
- **Rythm:** it is the repetition or highlighting of elements in a piece of work.
- **Harmony:** it is the organization of elements that highlight their similarities or differences.
- **Proportion:** it is the principle that allows the relationship of elements of the work with some characteristic. For instance, size.
- **Emphasis:** it is the combination of elements in a contrastive form to focus on a central element.
- **Variety:** it is a combination of elements using a pattern or relationship inside the work.
- **Gradation:** it is the combination of small changes that end up in a larger variation.

Did you know…?

In practice, it's important to analyze notable works of art from the standpoint of the artistic principles and using the elements of design for artistic appreciation. *We recommend visiting ArtBabble, where you will find information about art, exhibitions, and artists from more than fifty of the world's most important museums.*

Visual Structure

Aside from the basic elements of design and the artistic principles, there are also **visual structure** principles—derived from **Gestalt theory**—that can be used to explain specific

perception patterns that rely on the brain to simplify, order, and organize the objects we see.

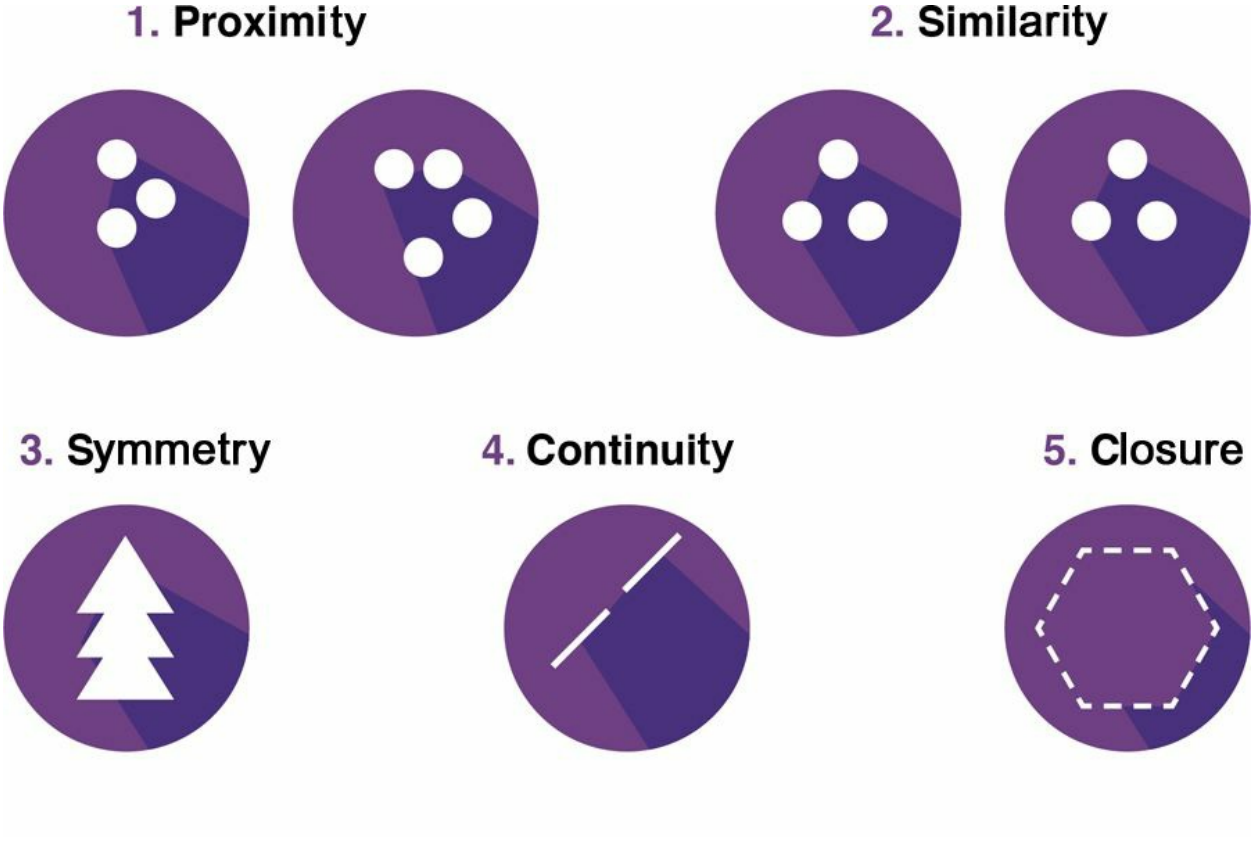
Cognitive psychology studies the way people perceive, learn, and remember. Perception comes from the senses, which are a form of channel we use to communicate with our surroundings. Therefore, to develop multimedia we need to know more about people's ability to appreciate their environment. Cognitive psychology offers a few theories about perception. One is called constructivist theory, which states that when we look at something, we don't retain all of it, only the parts we consider most important, depending on the context or on any preconceived ideas we may have on that subject. For example, you might remember something from a film, like a line or a sequence, but you probably won't remember the color of a character's clothing. Also relevant is our ability to recognize images or figures out of a background. You have probably seen images that you remembered one way, and then someone else might have said they saw something different because some recollections are ambiguous.

Did you know…?

You can learn more about perception through multimedia resources. *Visit the Interactive Visual Perception Encyclopedia.*

Click here

The Gestalt principles that analyze how we see are:



Graphic 1.6 Gestalt Principles.

- **Proximity:** describes the process we follow to use distance or location to create groups.
- **Similarity:** is when one perceives something as a whole instead as the parts it consists of.
- **Symmetry:** is given when elements are grouped by type or kind.
- **Continuity:** is grouping and identifying the flow or alignment they present.
- **Closure:** is the process in which we perceive forms that don't actually exist.

The following five principles can be used rationally in multimedia design to find the right visual structure. The way you arrange your elements will support or impair communication. Your visual structure will help you distribute content elements such as headings, subtitles, information, image, sounds, and videos, in a way that will point the user toward the important ideas. It will also display content in an organized and attractive way and will assist navigation and interaction between multimedia and the user.

On the other hand, you cannot have a strong visual structure without the right **content structure**, which is fundamental, because it helps present the information or the message we want to deliver.

Content structure classifies each category based on specific **organizational framework;** for example, alphabetically, chronologically, geographically, thematically, functionality, or per the type of audience. It also requires an **organizational structure** that organizes information into hierarchies or levels with hypertext links or locates it through database inquiries. Presentation and structure are essential to displaying precise information.

The way you organize your work will affect its appearance and how your readers locate content. The principles of proximity, similarity, symmetry, continuity, and closure give us an overview of a multimedia project's organization. These principles, which explain how we perceive, are linked to the following four factors, and will help you find the adequate visual structure for your content: **proximity, consistency, alignment**, and **contrast.** For example, if you see two elements close to each other, you are likely to assume they are associated, while those that are distant, might be regarded as independent or unrelated (proximity).

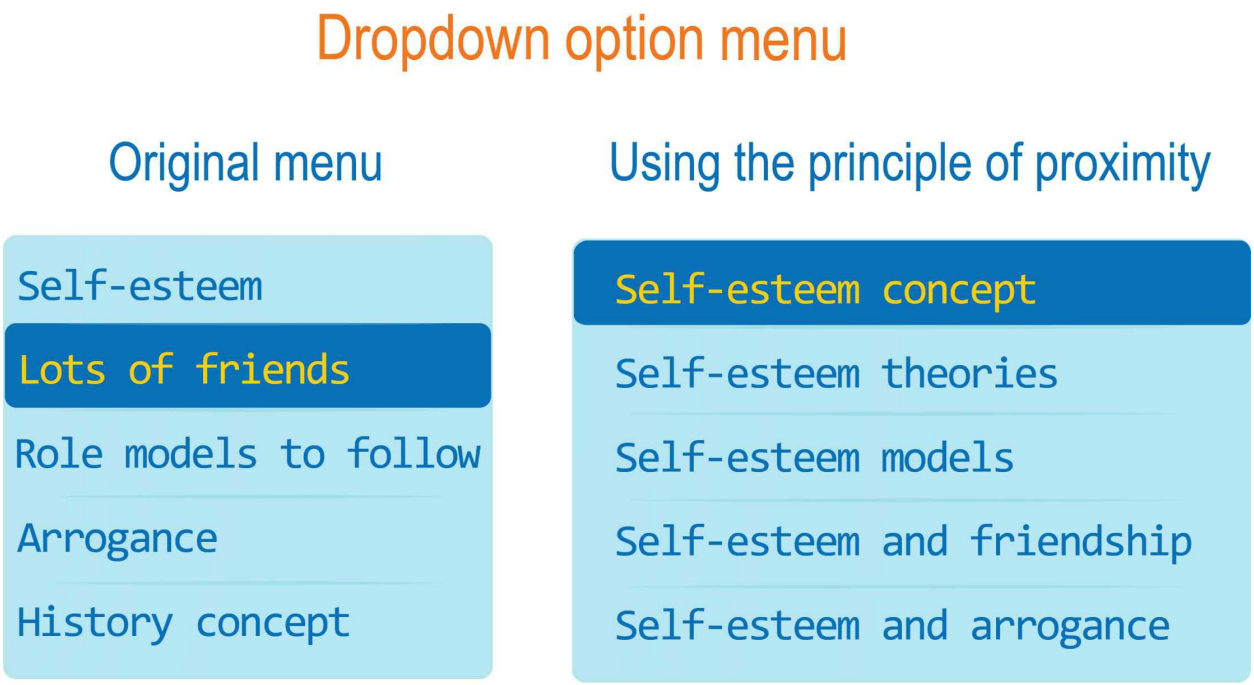


Figure 1.1 Examples of variations in proximity.

Figure 1.1 shows a scrolling list that has been arranged according to proximity, which gives each option on the list a sense of coherence. Another good example is when you can click on a title even when your cursor is far below or to the side of it, because this allows you to correctly distinguish the presence of an active button.

Figure 1.2 Examples of proximity in daily life.

Alignment consists of adjusting related elements along an imaginary line—above, below, or in the middle of the line—as a way of stating their equal importance or placing them in the same category. Alignment allows you to indicate interdependence or specify classification.

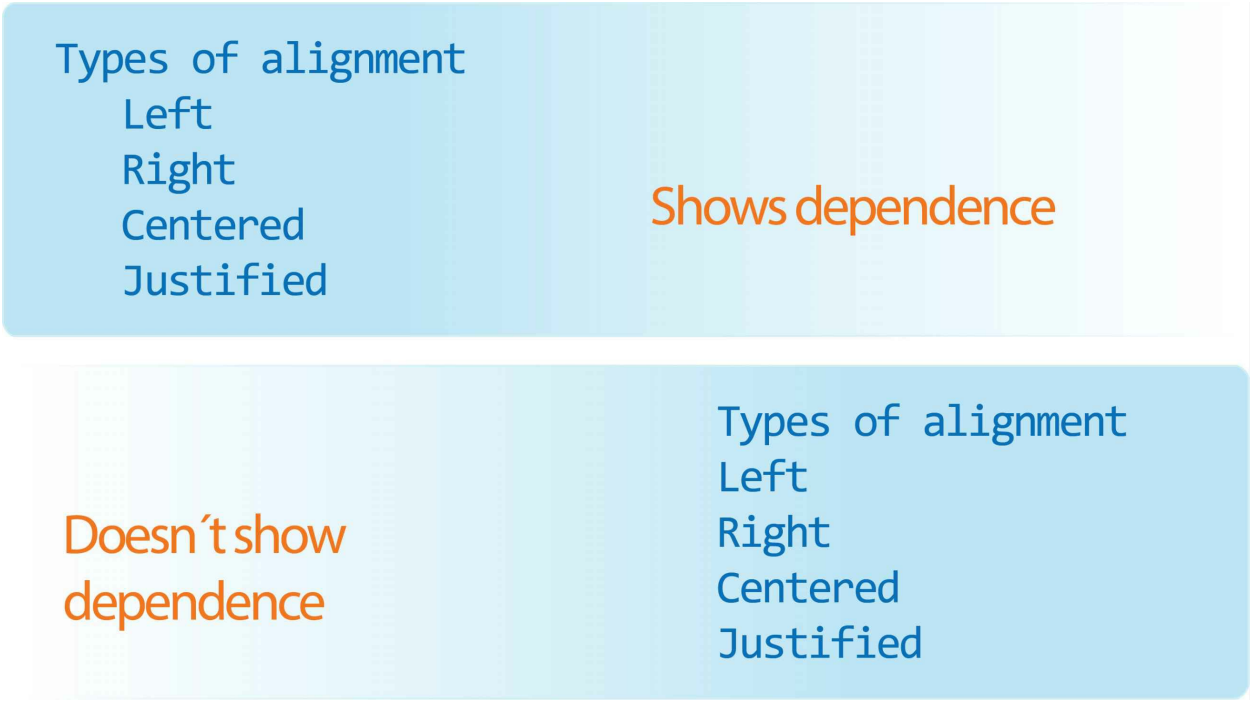


Figure 1.3 Examples of alignment.

Consistency helps distinguish interface design elements by size, color, or location. For example, a horizontal menu placed at the top of the interface displaying four aligned buttons with the same color, font, and function would look like this:

Figure 1.4 Examples of alignment in daily life.

Consistency gives web design a sense of regularity because it specifies elements that remain throughout the entire web site. It is easier for users to navigate every page on the site if the *home* button is always in the same place and if every individual element is aligned.

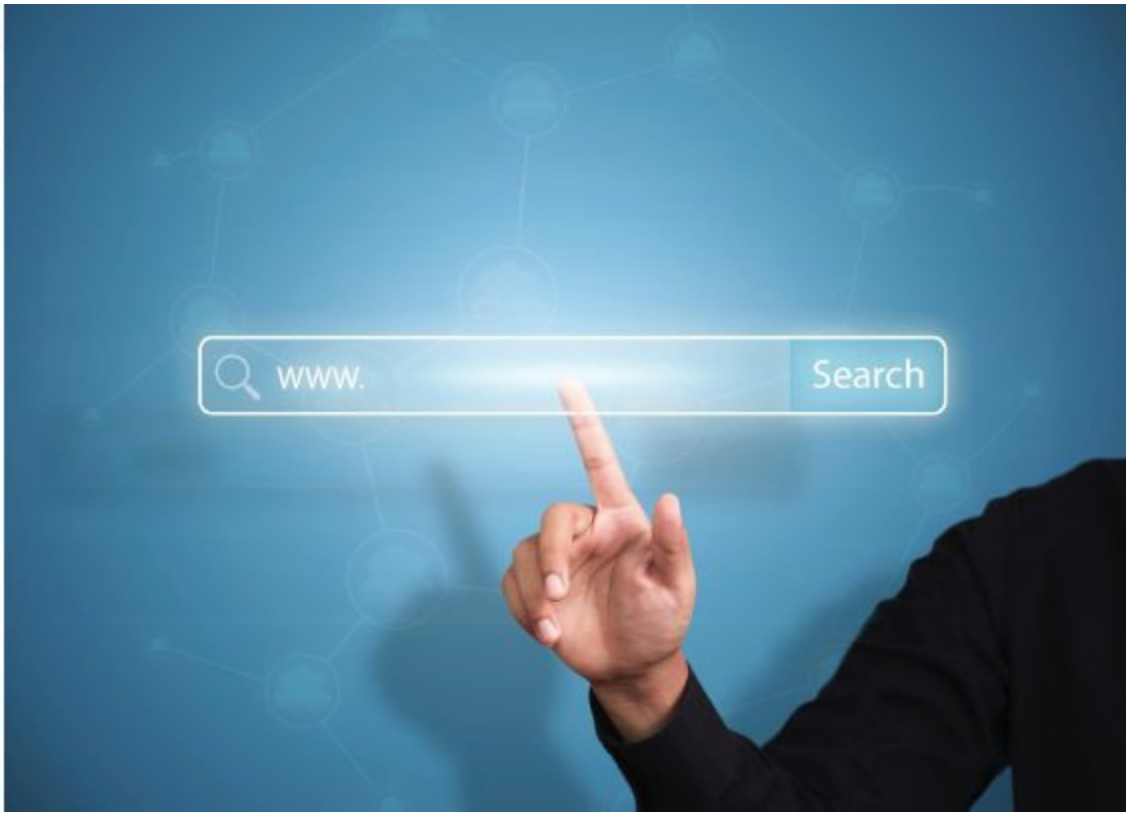
Contrast is used to distinguish different elements, or elements with independent functions, and can be created by adjusting font size or color and adding effects.

Figure 1.5 Examples of contrast.

When you consciously use composition and organization factors, multimedia projects become more attractive, user-friendly, understandable, and easy to navigate. Users' **navigation** or path of interaction will depend on the way information is organized and presented. It can be divided into hierarchies—if levels structure it—and have menus that open to the side or from top to bottom. Organization charts or book indices are clear examples.

You can also navigate using **hypertext**, which is possible if the work has hyperlinks. While flexible, hypertext often confuses users who become lost as they skip from one page to the next.

Finally, database navigation helps users find information without having to visit many web sites. In this type of navigation, users fill in forms with specific key words that represent what they are trying to find. Information is then recovered from the database through searches that can be generated using logical operators such as AND, OR, NOT.



© thinkstockphotos.com
/Business hand pressing Search button, Internet concept

While interacting with multimedia, users should always be able to know their location and how they got there. Color changes in active menu elements can be valuable guides on websites that use hierarchical navigation. When navigating through hypertext, **breadcrumbs** can show users the way back. Finally, when searching through databases, it is important to keep track of research strategies and display key words and logical operators.

Navigation systems should provide consistent elements that provide users context they can understand. When we speak of navigation elements, we are referring to texts, buttons, and graphics that give users their current location.

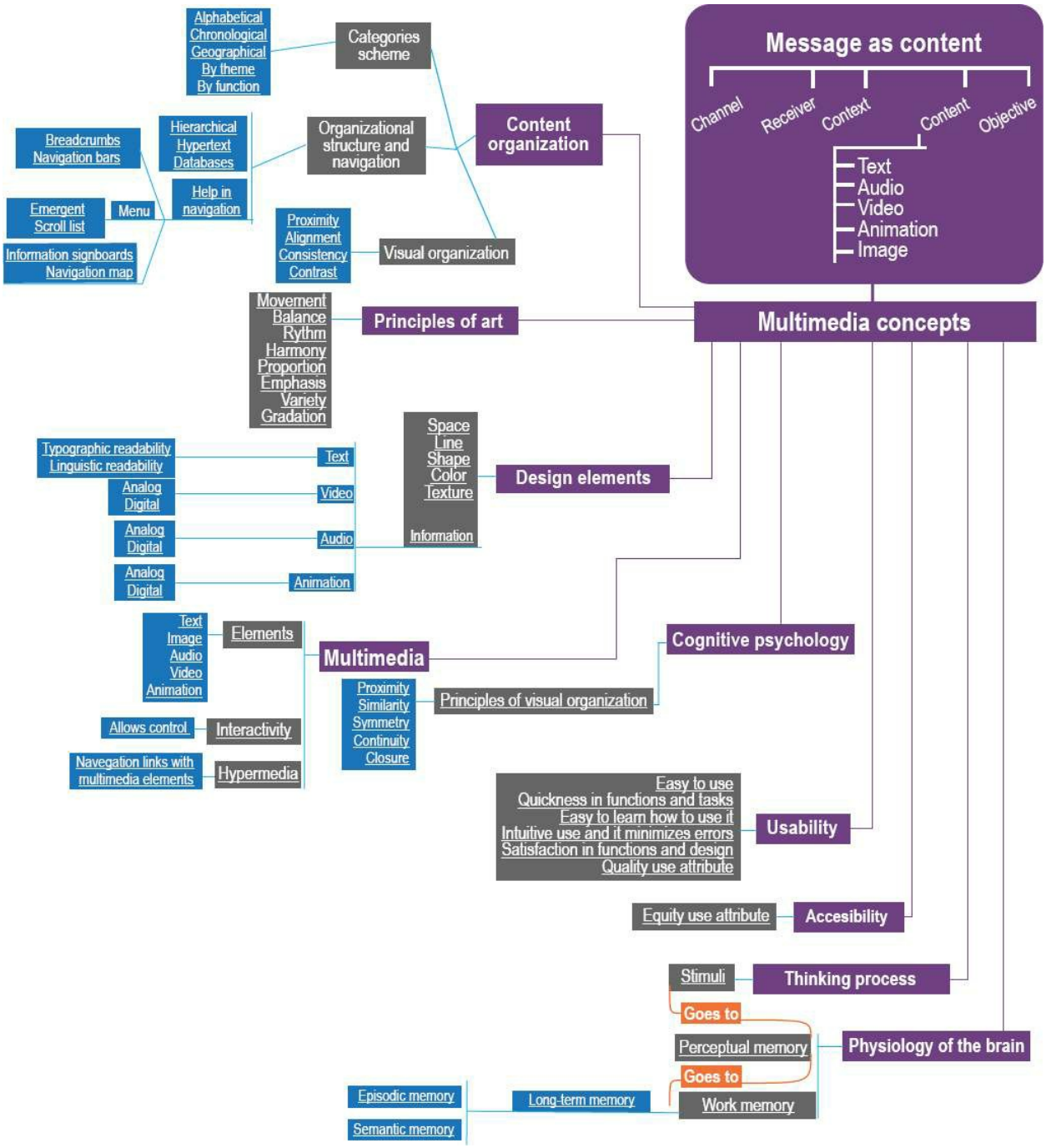
Navigation bars that gather series of buttons or hyperlinks are a common **navigation element.** Users should be able to distinguish the purpose of each element.

Menus are another common navigation element that often leads to a list of hyperlinks or **dropdown menus.** Elements should be analyzed by size and classification and should lead to

information in the least number of clicks possible. Users should also be able to preempt the type of information that will emerge from the element.

Frames, on the other hand, are panels that occupy certain space on the navigator window and are used to limit content areas.

When designing a website, we recommend using **navigation maps**, which are drawings that visually display the structure and the connections between elements that provide relevant content; they can be linear, hierarchical, non-linear, or combined.



Graphic 1.7 Sample navigation map.
Full size image here.

The Element of Color

Color plays an important role in Web design. It provides visual elements that tell us—without requiring much explanation—if a button is active, if a hyperlink has been used, if there are functions related to certain objects, or if there is additional content or assistance options.

Color is a physical phenomenon, but it is also a matter of perception. When we look at something, we notice color as well as shape and size. However, what we are seeing is only an illusion, because it is nothing more than a sensory impression. Think of oil stains on water. When light is refracted, tones appear on the surface, even though water is colorless. This is possible because our eyesight is capable of transforming stimuli into sensations. Fabric, for example, can receive and reflect a light wave our brain transforms into color.

Visible light is only a small part of the electromagnetic spectrum and has a wavelength ranging from 400 to 700 **nanometers**. Different colors have different wavelengths. We see white when all frequencies of visible light are present; black, on the other hand, represents the absence of color.

© thinkstockphotos.com /Multicolor spectral circle from 24 segments

We perceive color through our sense of sight, using our eyes. Inside the retina are photoreceptor cells, known as cone cells. Some cone cells capture the visible spectrum for the color red; other cone cells react with yellow and others with blue (the three primary colors). Next to these cone cells is a different type of cell that captures electromagnetic radiation and perceives changes in luminosity. Most colors are a combination of wavelengths, and when these waves collide inside the retina, all three types of cones offer a response, which the brain absorbs and classifies. Once the brain receives information about color, another process begins, involving cultural aspects, previous experiences, and associations connected to connotations of pleasure, depression, excitement, or other feelings.

Did you know…?

The *Paletton, Color Scheme Designer* is a design palette generator that uses the color wheel to create monochromatic

schemes with adjacent colors, triads, and complementary colors. Thus, you can create a demo for a web site with selected colors and design environments with different ranges of colors. *Don't forget to check it out.*

Text Element

Books are probably the first thing that comes to mind when you think of how you acquire knowledge. Throughout history, human knowledge has been transmitted in written form. However, Internet documents are also a form of text. The language we use to create web sites consists of **HTML** (Hypertext Markup Language) instructions and derives from text with linking capacities.

When we read, we try to understand what we've read, and when we write we try to deliver a readable message. If a text is organized coherently, it will be easy to read and understand. When we elaborate multimedia elements, we must ensure they have **linguistic readability.** Users will find it easier to process information if we choose the right words, manage our sentence length and structure, avoid redundancy, and use terms that suit the target audience.

During the planning stages of any multimedia project we should try to ensure that our audience can read our words. Titles, subtitles, menu options, hyperlinks, and content must be expressed in a clear and simple manner. Vocabulary should match the audience and the topic.

Structure can be used to distinguish important information from less relevant information. The reader should only have to read the text once to understand it.

Multimedia developers must:

a. be knowledgeable and have writing skills,
b. have enough experience to write the text with the necessary formality and with structure and coherence so that the message can flow through the presentation as expected, and
c. be able to decide if they need to add rhetorical resources.

Writing requires analytical skills, research, framework, and the ability to organize information and ideas. It also requires re-writing and text assesment skills.

Typographic readability is specifically concerned with font, size, contrast, shape, color, and stroke. **Typographic readability** refers to the way we perceive letters. **Typography** is the art of designing typefaces and written characters that assist in communicating or transmitting a message.

Concept	Description	Example
Typeface	Family of graphic characters that includes different sizes and styles. This is why it maintains similar characteristics.	Times New Roman.
Font	Collection of characters of same size and style that belong to the same family.	Times New Roman, size 12, bold.
Font style	Specific attributes.	Times Bold, italics, underlined.

Font size	It is measured by points. One point equals 1/72 inches.	Font size 10.

Table 1.4 Text element concepts.

Fonts are classified according to the presence or absence of certain elements. For example, we can divide them into two greater groups: *serif* and *sans serif.*

Serif typography	*Sans serif* typography
A serif is a finishing touch at the end of a letter. Serifs come in different shapes known as lapidary, Venetian, Egyptian, transitional, Bodonian, linear, and others. Fonts such as Times New Roman, Century, and Bookman are examples of serif typographies. Serif type fonts are often used in print media because they allow greater readability. However, reading serif fonts can become tiresome on low resolution monitors that range from 72 to 120 pixels per inch. The font Georgia is an adaptation of Times New Roman designed for optimum screen readability.	Sans serif means without serifs. This typography first appeared in the 19th Century and was known as grotesque in Europe and Gothic in America. Some examples of sans serif typographies are Arial, Verdana and Franklin Gothic. Sans serif fonts are used in print media for headlines or bold sentences. Their use is recommended for long paragraphs with small fonts because they can result more attractive and legible. When writing for the Web, Verdana is recommended over Arial because it is slightly wider, and the space between the letters is larger. Verdana is less curved and more gradual.

Table 1.5 Font groups: *serif* and *sans serif.*

Fonts vary according to character width. For example, “W” is wider than “J”. Some fonts are spaced proportionally, so that a letter’s width responds to its natural geometry and increases readability. However, in some cases, all letters need to be of equal width, to facilitate alignment. These fonts are known as monospace and are often used in programming. *Courier* font is one example, as well as any font that has the word Monotype as a prefix.

Script, for example, is a type of font designed to simulate handwriting. Keep in mind that some navigators don’t support these fonts and may cause readability problems. Some fonts like *Webdings* provide images in the shape of characters. *Symbol* is another example of this type of font.

Multimedia Web designers should be aware that the final product will depend largely on users’ hardware and software. Keep in mind that:

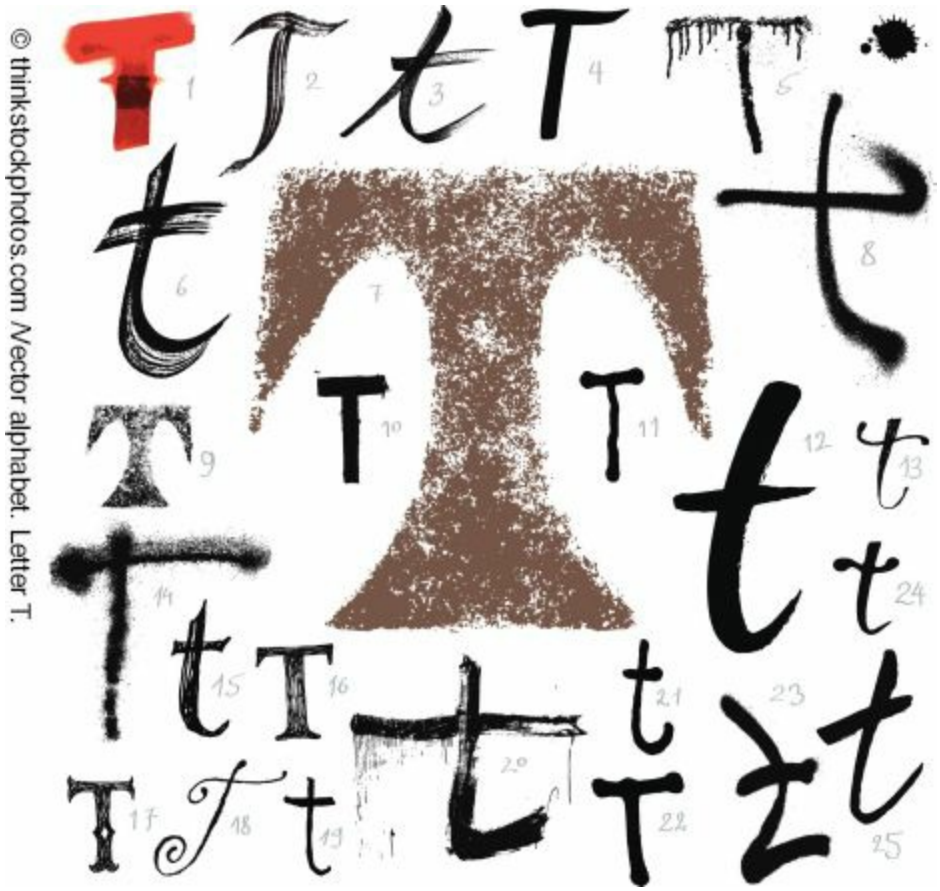
1. Sharpness will depend on the monitor and video card. Also, **display resolution** can affect font sizes.
2. Navigator windows vary in size and might change the number of lines suggested in the original design. Readability may be affected if an interface displays more text than the

designer intended.

3. Text size may vary. Users can enlarge or reduce it through their navigator's preference menu.
4. Readability may also be affected if the user changes the display's brightness, contrast, or color balance.
5. Some designs may use fonts that are not always available and could be automatically substituted by the device's default configuration.

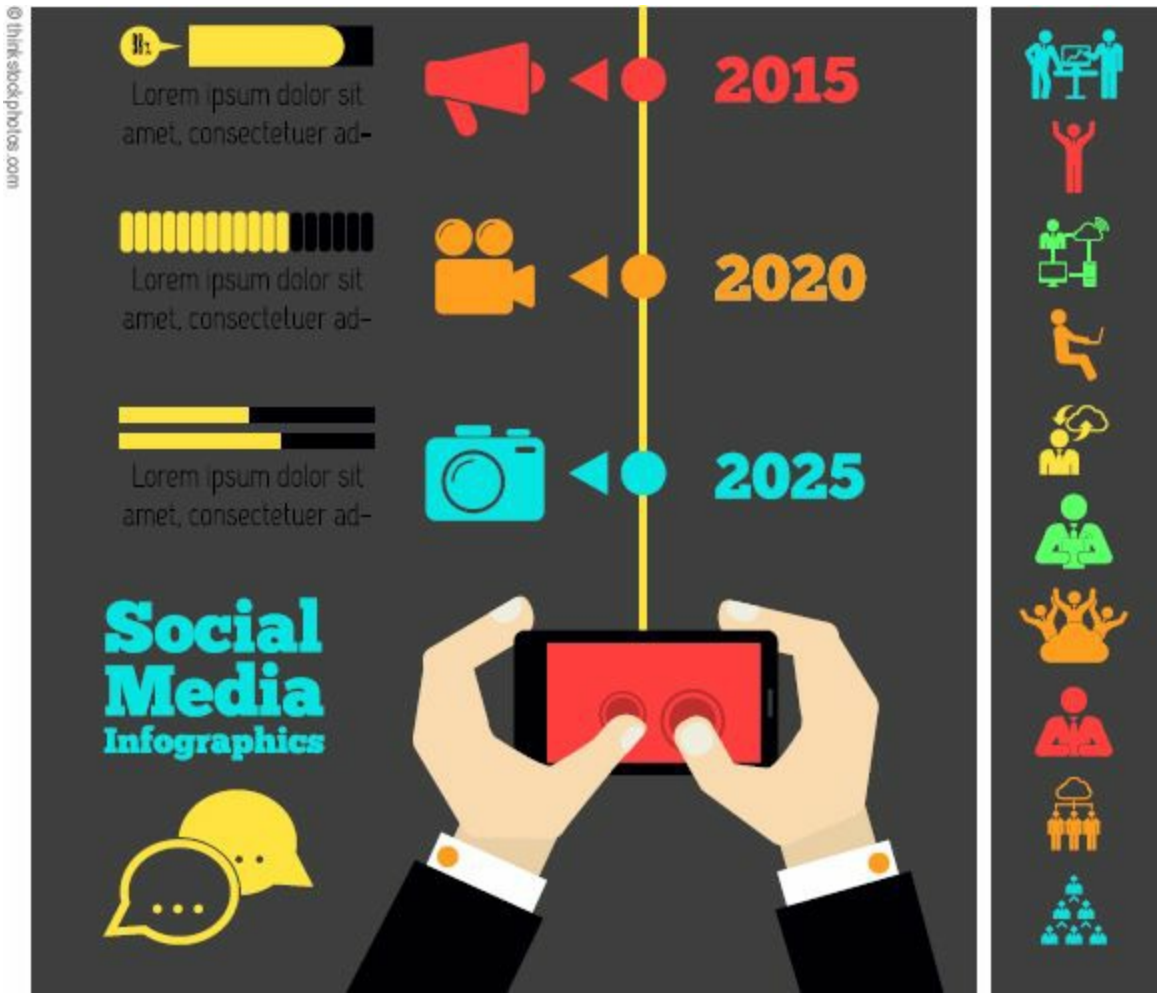
The following guide will help you select a suitable font:

1. When using small letters, choose the most readable font.
2. Avoid using different fonts in the same document. A better option is using a font from the same family, varying width, size, and style.
3. For long paragraphs, modify spacing to increase readability.
4. Use different sized fonts for titles, headings, and body text.
5. If headings are longer than a single line, adjust letter spacing to reduce space and increase readability.
6. Use effects to highlight headings. Contrasting letters and backgrounds are recommendable but always maintain uniformity and clarity.
7. Text should never present spelling mistakes or poor grammar.
8. Use capital letters correctly and avoid writing entire paragraphs in capital letters.
9. Avoid centering large blocks of text.
10. Define keywords with hypertext and use them in menu descriptions.
11. Use the same color for all hypertext.
12. Use boldface type or highlight important ideas in the text, but distinguish them from hypertext to avoid confusing readers who might interpret these distinctions as links to further information.
13. Use 14-point font (or at least 12-point font) when writing for people older than 65 years of age.
14. As a general rule, use left-aligned text.
15. Never use underlining to highlight online text, it could be misread as a hyperlink.



The Image Element

Images are important because they stimulate the eye and express ideas with shapes and colors. Images can be stored in a range of digital formats that allow different degrees of **compression**, visualization, and coding. We will have a closer look at this element in the next chapter.



The Audio Element

Audio supports the visual experience by adding voice, music, or sound to multimedia projects. It creates an atmosphere that generates emotions and opens adequate communication channels to deliver a message. Audio can make or break a project.

Sounds can be created, recorded, edited, and integrated into multimedia projects by using sound and audio editing programs. In this type of project, elements are stored on digital files with different compression formats.

Did you know…?

LibriVox.org **is a collaborative resource created by users who read and record free public domain audiobooks, and** *Whosampled.com* **is an app that explores music's DNA.**

Explore more than 272,000 songs and 95,000 artists to find connections between songs.

Get to know these web sites.

The Video Element

Along with animations, video is an element that relies on computer processing and memory functions.

Conversion software can transfrorm **analog video** to a digital format, though it often requires a lot of storage space. As a guideline, high definition color photos require at least one megabyte; one second of video is equal to 30 images, or 30 megabytes. The larger the file, the longer it takes to download, and it is important not to keep users waiting. Multimedia developers can lower image resolution to make video files smaller. As a result, video quality will be affected and caution is

recommended—users will compare it to television quality, which can be hard to match online. As a rule of thumb, only use video when absolutely necessary.

Video recorded on a digital or analog camera can later be modified by using editing software. You can also purchase footage through archives.

Did you know…?

Crackle.com **is a Sony Pictures Entertainment company that distributes digital video and offers films and series from Sony Pictures' library.**

Euscreen.eu **offers a range of commercials, educational videos, fashion, politics and other European videos in 19 different languages.**

Watchknowlearn.org **is an educational free video repertoire (with more than 50,000 titles) available for students and teachers.**

The Animation Element

Images and animation are usually the most attractive features in multimedia presentations. Animations are created by using consecutive images that simulate movement. Animation allows interactivity because, unlike video, it is not linear and enables tools like hyperlinks and decision structures that will enrich the user's experience.

Persistence of vision is a biological phenomenon, known as the "phi" phenomenon in psychology, that occurs when our eyes are exposed to consecutive still images that create a sense of movement. Television traditionally uses 30 frames or images per second, while film runs at 24 frames per second.

Did you know…?

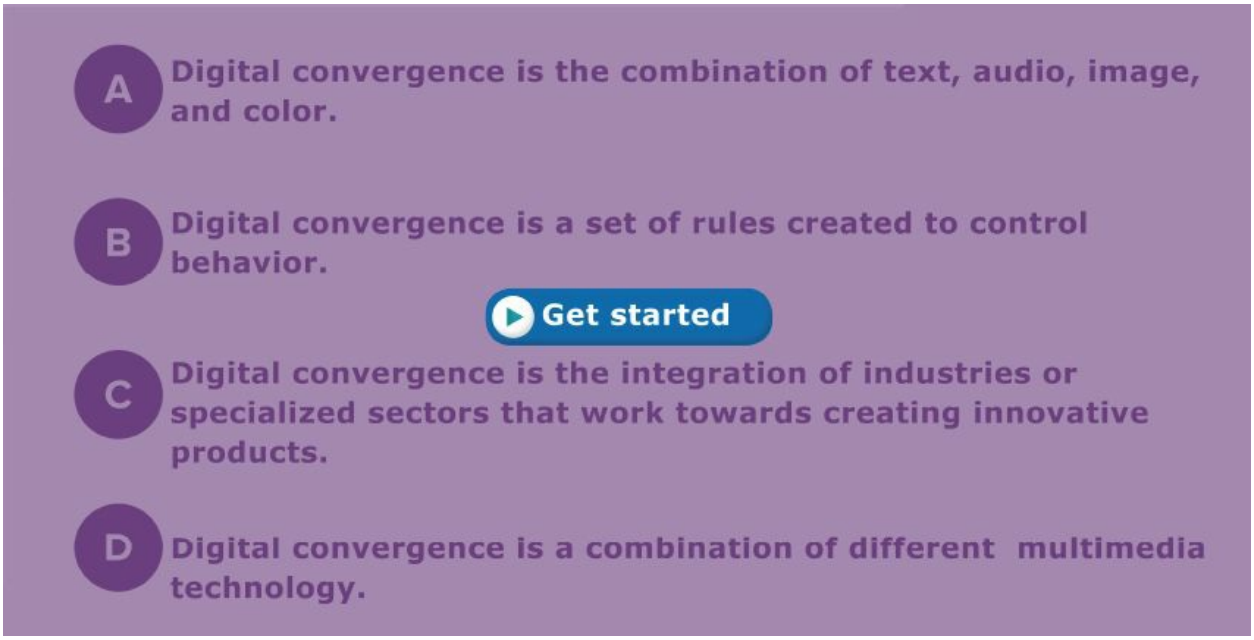
In 2012, the creator of *WatchLearnKnow.org* **launched** *Readingbear.org*, **a portal that teaches reading through music, video, and animation.**

UCLA Preserved Silent Animation **is yet another resource where you can find animations that will show you how to create something similar.** *Don't miss these sites!*

Integration Exercise 1

Question 1

According to what you learned in this chapter, which of the following definitions best describes "digital convergence?"



Chapter 1 | Conclusion

This chapter looked at the fundamentals of multimedia expression. We started by identifying the elements that help us communicate information, ideas, concepts, processes, or products through multimedia technology in a creative and original way.

This creative work is in itself a message tailored to the medium that will become your channel. In multimedia communication design, you need to establish your goal, know your target audience, and be familiar with different media so you can present your digital message on the best possible interface. Each element should have a purpose and should contribute to a coherent and organized composition that uses basic design elements as established by visual communication theory, and in accordance with the artistic principles and visual structure principles of cognitive psychology.

We also learned that our brain physiology and thought processes limit the amount of visual and verbal elements we can take in at one time. To transform perceptions into long-term knowledge, we need to engage our working memory and perceptual memory. Thus, information will become more meaningful to the person who receives it. Content structure and navigation elements promote interactivity. They enable the receiver to participate and become involved while exploring digital content. Finally, during our review, we briefly analyzed the elements of text and color, as well as image, audio, video, and animation as an introduction to the following chapters that will offer a close-up view of these components.

According to Beer and Gues (2013), as technology becomes more prevalent and easy to access—or "omnipresent," as they described it—it will also become a natural environment for artists. These explorations into perception and consciousness will increase the possibilities for digital expression, and at some stage, hyperreality and virtual reality may become artistic genres of their own. Multimedia expressions combine illusions, reality, imagination, and representation while questioning who we are and what we are doing. It's worth asking ourselves if we might be at the threshold of a humanist renaissance — one in which technology, rather than being cold and dehumanizing, becomes a way to reconfigure a newer and more human type of men and women.