

DIGITAL LIFE

GENO309



PONGRAPEE KAEWSAIHA



Instructional Material

GEN0309 Digital Life

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Preface

University students are likely already using digital technologies in their daily lives and their studies. Social media communication and searching for various information can be made convenient, thanks to the massive amount of accessible data on the internet. But that convenience is the root cause of piracy, unauthorized access, cyberbullying, and health problems caused by excessive use of digital devices. These are just a few of the problematic internet use and cybercrime. Therefore, students must not only use digital technology effectively but must use it with caution and responsibly.

Digital Life (GEN0309) is a general education course at Suan Sunandha Rajabhat University. This course will introduce digital technologies that are useful for living in the digital world as well as new technologies that revolutionize business and other industries for students to keep up with the modern era. This course also places a strong emphasis on using technology responsibly for both oneself and others. It offers guidance on what to look out for, what to do if we encounter potential cyber threats, as well as best practices for living in the digital age.

Pongrapee Kaewsaiha
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Course Plan

Course Code: GEN0309

Course Title: Digital Life

Course Description

Basic knowledge about digital, roles of digital as megatrends influencing the changes in Thai and Global societies in a variety of forms, the invention of buildings, equipment and smart devices accompanied by the application of the Internet of Things, social network, consumption behavior via communication devices, law, online or social network enterprise, living one's life in and human adjustment to the fast-growing digital technology with happy and secure life in each age group.

Objectives

- 1) To present modern digital technology used in daily life, study, and work.
- 2) To promote the efficient, ethical, and safe use of digital technology.
- 3) To illustrate the changing behavior of consumers in the digital age, as well as digital technologies used in the business sector to meet consumer needs.

Content

Chapter 1: Life in the Digital Age

- 1.1 Digital Literacy
- 1.2 Digital Citizenship
- 1.3 Digital Technology in Everyday Life

Chapter 2: Intelligent Technology

- 2.1 The Three Digital Pillars
- 2.2 Extended Reality (XR)
- 2.3 Intelligent Technology Applications

Chapter 3: Digital Media Technology

- 3.1 Digital Media
- 3.2 Infographics
- 3.3 Issues Related to Digital Media

Chapter 4: Social Network & Social Media

- 4.1 Roles of Social Network and Social Media
- 4.2 Social Media Literacy
- 4.3 Social Media Trends

Chapter 5: Digital Economy

- 5.1 Consumer Behavior in the Digital Age
- 5.2 Digital Business Ideas
- 5.3 Financial Technology

Chapter 6: Digital Commerce

- 6.1 E-commerce and Digital Commerce
- 6.2 Launching a New E-business
- 6.3 Things to Consider when Buying and Selling Online

Chapter 7: Digital Wellness

- 7.1 Potential Health Issues
- 7.2 Maintaining Health and Safety
- 7.3 Digital Health

Chapter 8: Digital Security, Ethics, and Law

- 8.1 Cybersecurity
- 8.2 Information Ethics
- 8.3 Digital Law

Teaching Methods and Activities

This course is organized in a hybrid mode. Learning activities have been designed to suit learners who study from different places and times and have different equipment availability. Students will learn through the following activities.

- 1) Classroom lectures will be held on-site and will be broadcast to video streaming platforms and online meeting rooms in real-time
- 2) Meeting recordings for on-demand learning and reviewing
- 3) Interactive courseware with audiovisual materials, such as pre-recorded videos, slideshows, and quizzes, for self-paced learning using a micro-teaching method
- 4) Online questionnaire and self-evaluation for lesson introduction
- 5) Online quiz with auto-graded questions
- 6) Individual project or assignment
- 7) Special lecture by a guest speaker

Teaching materials

- 1) Instructional material: GEN0309 Digital Life
- 2) Presentation (PPTX)
- 3) Courseware (Moodle SCORM)

Lesson Plan: Chapter 1

1. Topics

- 1) Digital literacy
- 2) Digital citizenship
- 3) Digital technology in everyday life

2. Learning objectives

By the end of this chapter, students should be able to:

- 1) Recognize the digital literacy necessary to live in the digital world.
- 2) Employ digital skills to solve technological problems efficiently, effectively, ethically, and safely.
- 3) Differentiate between digital natives and digital immigrants.
- 4) Distinguish what digital citizens should and shouldn't do.
- 5) Tell how humans have adopted digital technology since the beginning of the digital revolution.
- 6) Recognize the levels of digital transformation in the organization.
- 7) Assess the needs and impact of digital transformation on the organization.

3. Teaching methods learning activities

Introduction

- 1) Welcome students to the class. Announce important information, including class schedule, activities to be done, individual project instruction, assessment and evaluation.
- 2) Introduce how to use the learning management system. Coordinate with the teacher assistant team to resolve technical issues (e.g., unable to log in).
- 3) Explain the need for digital literacy in the digital age.
- 4) Students complete the digital literacy evaluation form. Criticize the overall results.

Presentation

- 1) Describe the eight components of digital literacy and link them to what students previously self-assessed.
- 2) Give examples of a technology issue, have students express their opinions and find information to support their ideas.
- 3) Describe the difference between digital natives and digital immigrants.
- 4) Describe the characteristics of a good digital citizen.
- 5) Ask students if the given situation indicates the level of cyber threat, how they would react if that happened to them, and how to avoid that in the future.

6) Explain how humans have adopted digital technology since the beginning of the digital revolution.

7) Describes the digital transformation necessity that organizations must undertake to meet the changing consumer behaviors based on technology advancements.

Conclusion

- 1) Give the lesson summary.
- 2) Students review the lesson from the interactive courseware.
- 3) Students complete the chapter quiz.

4. Teaching materials

- 1) Instructional material: GEN0309 Digital Life
- 2) Presentation (PPTX)
- 3) Courseware (Moodle SCORM)

5. Assessment and evaluation

- 1) Participation in the class, online meeting, live stream, or meeting record
- 2) Completion of the digital literacy evaluation form
- 3) Participation in the discussions
- 4) Courseware attempts
- 5) Quiz score

Chapter 1

Life in the Digital Age

Technology is there at every turn in the modern generation. Gen-Z citizens may easily pick up the skills necessary to use digital technology for life and learning. However, it might not be easy to use technology appropriately and efficiently. For example, millions of individuals use search engines daily, but only a fraction can find the most valuable results. Also, utilizing technology involves great responsibility because it has positive and negative aspects. It was found that people occasionally share offensive material or false information on social media. In business, while it is easier to utilize online services, there are several cyber threats to be aware of. This chapter emphasizes the ethical and appropriate use of digital technology in addition to the technical proficiency required to use them.

1.1 Digital Literacy

The American Library Association (ALA) defines digital literacy as "The ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills." Technical skills are what we need to use equipment and perform technological tasks. Cognitive skills refer to the ability to use existing knowledge to analyze situations, choose appropriate methods or tools, refine, and learn to improve. According to [Payton & Hague \(2010\)](#), digital literacy consists of eight components, as shown in **Figure 1.1**.

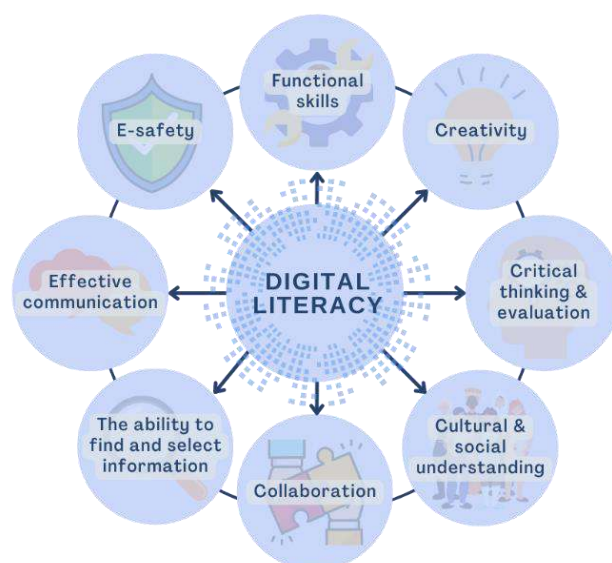


Figure 1.1 Eight components of digital literacy

Sources: Own work using [Canva Education \(Terms\)](#), adopt from Payton & Hague (2010)

1.1.1 Functional skills

Functional skills are fundamental elements of digital literacy. They show how well we can use digital devices and programs to perform technical tasks. Some of the functional skills are as follows:

- 1) The ability to use a presentation program
- 2) The ability to use social media platforms
- 3) The ability to use search engines
- 4) The ability to send and receive emails
- 5) The ability to make transactions using a mobile banking application
- 6) Etc.

Different IT tasks require a combination of functional skills. Word processing competence may be all that is needed for simple activities like writing reports. Complex tasks like creating a video presentation may involve installing recording equipment and using media editing software. Without adequate skills, it can be challenging to achieve a concrete outcome.

1.1.2 Creativity

Creativity represents the ability to use technology to create work and present knowledge in creative, innovative, and effective ways. People with equivalent functional skills may come up with results of varying quality depending on their creativity. **Figure 1.2** shows two presentations under the same topic created with different levels of creativity. Creativity also includes creative solutions to technological problems using existing knowledge. There can be several possible solutions for each situation. Creative approaches may not be straightforward but are more effective or yield better results.

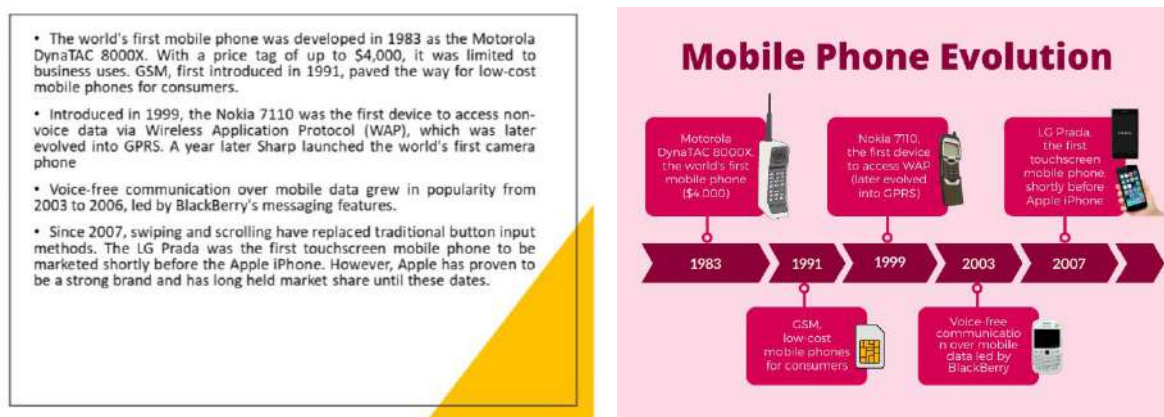


Figure 1.2 Presentations with different levels of creativity

Sources: Own work using PowerPoint, [Wikimedia Commons](#) (CC BY-SA), [Flickr](#) (CC BY)

1.1.3 Critical thinking and evaluation

In the past, writings published in print media had to undergo rigorous editing, peer review, and expert review. The process can take days, months, or even years. Work of poor quality or reliability had little chance of being made public. Social media today enables users to act as editors themselves. Anyone can publish anything anytime with little to no screening. Fake news and malicious content can spread rapidly for that reason.

Critical thinking uses reasoning skills to question, analyze, and scrutinize what we experience in the digital world. People with critical thinking skills can evaluate the credibility of the content in order to support or oppose the information they see online. **Figure 1.3** shows the dubious news claiming that cocaine can kill the coronavirus. Upon closer inspection, numerous things don't seem to be in order.

- 1) The image source was intentionally concealed.
 - 2) The correct scientific name is "coronavirus" (without space), not "corona virus."
 - 3) "Scientists is" doesn't look right. That should be "scientists are" or "scientists were."
- Trusted news channels rarely make such grammatical mistakes.
- 4) Searching the headline on Google confirms that these are fake news.
 - 5) Further investigation revealed the web app that creates such images.



Figure 1.3 Investigation of suspicious news

Sources: Own work using breakyourownnews.com, [Flickr](https://www.flickr.com/photos/14914420@N00/) (CC BY), Google Images ([Terms](#))

1.1.4 Cultural and social understanding

Information technology allows people around the world to communicate in real-time. As we live in a multicultural society, we can connect with those of different races, religions, cultures, and beliefs. Discussing sensitive issues with differing beliefs often leads to conflicts that can escalate into global issues.

Although most social media and content publication platforms allow users to restrict access, it is well-known that what is on the internet will be there forever. Wouldn't it be better if we avoided discussing those sensitive topics altogether? We won't have to be concerned about if what we post will cause future issues if we honestly believe that individuals of various ideas can coexist.

1.1.5 Collaboration

The idea of teamwork is prevalent in schools and workplaces. We often rely on teamwork to accomplish reports, presentations, and projects. When team members work from a distance, individuals can finish their parts, and someone can bring all the pieces together in the final step. Another option is to specify a workflow in which one person edits a file and then transfers it to another after completing their task. Due to team members utilizing various applications or versions, people using these methods frequently experience issues with document formats being distorted. Typically, there is no indication of who changed the file, when, or which version is the most recent. These inaccuracies result in extra work and unnecessary revisions.

The concept of online collaboration is different from regular teamwork. When people collaborate online, project files are stored in the cloud drive and shared within the team. Members will access and edit the project files as assigned. There won't be any doubt regarding which file represents the most recent edit because files are updated in real-time, and all changes will be tracked. If a problem is discovered, files can be restored to the desired version. Because it's a cloud app, everyone uses the same version or a compatible application by default which minimizes document format distortion. **Figure 1.4** demonstrates online collaboration using Google apps where project files are saved in a shared Google Drive folder. Team members sign in and edit using Google Docs editors.

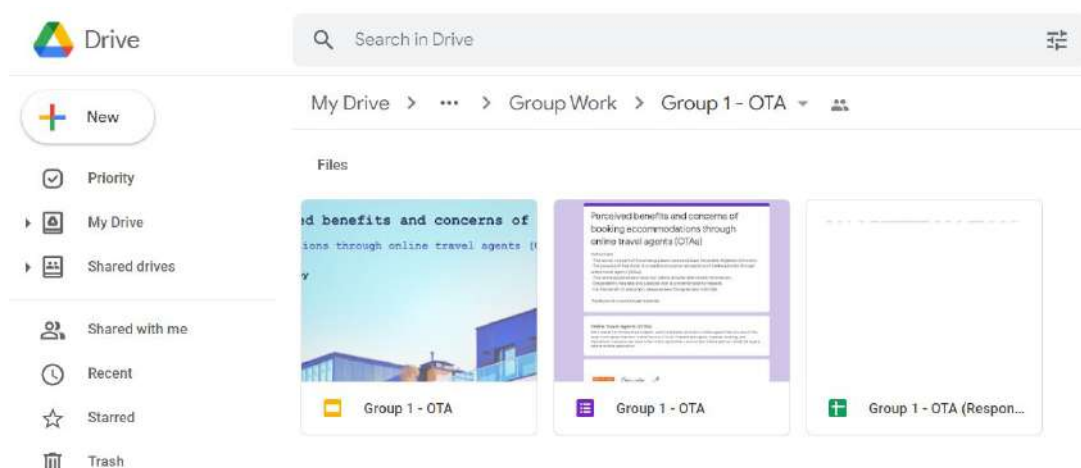


Figure 1.4 Online collaboration using Google apps

Source: Own screenshot showing Google Drive ([Terms](#))

1.1.6 The ability to find and select information

Everyone is familiar with using search engines. However, simply entering a search term does not ensure that we will discover the most relevant information to our inquiry. Ideally, we look for the single most relevant search result, not the billions of irrelevant ones. Additionally, even if we locate exactly what we are looking for, the right to use it may change depending on the intended use.

Being at the right place is the first step in an effective search. Searching for academic articles should be done on [Google Scholar](#) instead of the Google homepage. Instead of using Google to find a certain Ph.D. dissertation, check the university's library.

Defining the correct search terms is essential to get the desired results. The phrase "hardware" will return billions of results for computer hardware, as well as electrical and home appliances. If you use the search term "computer hardware," all non-computer-related results will be disregarded. When you type "computer hardware pdf" into a search engine, PDF files will appear as search results. When search phrases are entered inside quotation marks, the search engine looks for documents or websites that specifically match the phrase. **Figure 1.5** shows searching for the phrase "if you don't have a competitive advantage, don't compete." The quote's author and the date it was first published can be identified through search results. Additionally, we can use operators to narrow the search. A term is removed from the search when a negative sign (-) is inserted before it. For instance, if you add "-paid -credit" to the search keyword, you get results without these two words. This search technique can help us avoid paid content. The wildcard (*) in the search term can be replaced by any word or phrase. The search term "students with * impairment" returns the results that include students with visual impairment, students with physical impairment, students with cognitive impairment, etc.



Figure 1.5 Phrase searching with quotation marks

Source: Own screenshot showing Google search ([Terms](#)), contain third-party images (Fair use)

Google Images is a nice place to look for photos, but search results have a mixture of copyrighted and non-copyrighted images. The Creative Commons option (see **Figure 1.6**) tells Google to include only photos that permit reuse. While these images can be used without infringing copyright, users must comply with the license agreement (e.g., provide appropriate attribution or credit).

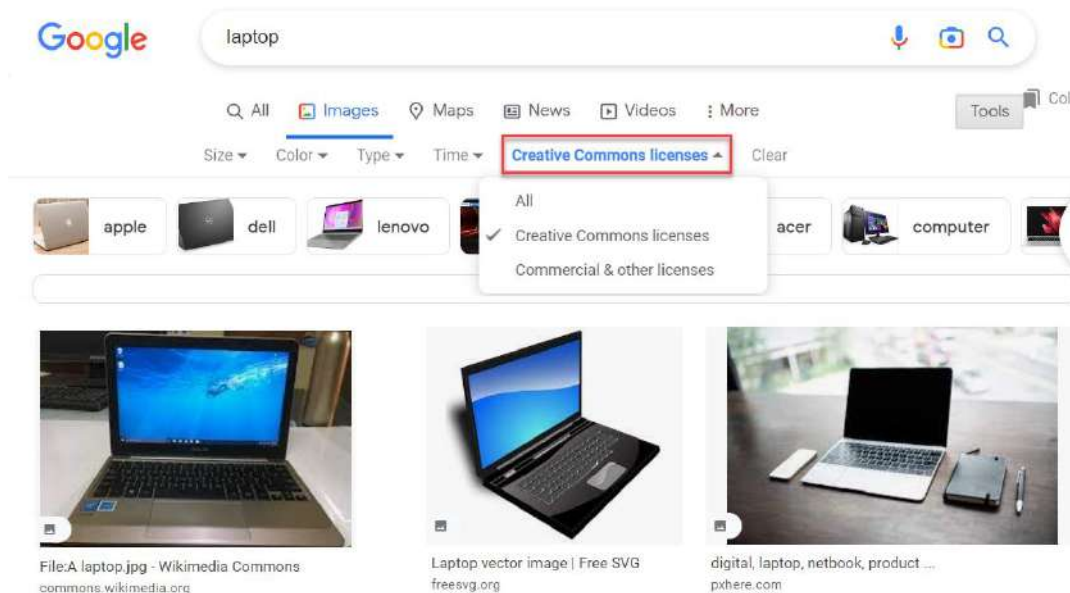


Figure 1.6 Creative-commons photo search on Google Images

Source: Own screenshot showing Google Images ([Terms](#)), contain third-party images (CC BY)

1.1.7 Effective communication

We relied so heavily on face-to-face contact in the past. Although it is not as convenient as telecommunication, it can convey important messages, including facial expressions, tone of voice, body language, and grooming. Instant messaging is ideal for short information exchanges but may not effectively convey strong feelings. To make up for that, telecommunication platforms frequently include emoticons, audio, and video messages. However, we might need to avoid online communication entirely if the topic is serious.

Writing business emails is different than talking to pals on the phone. As such, organizations frequently offer email and cover letter templates for contacts both inside and outside the organization. Likewise, even while everyone is aware that participants are in various regions and time zones, showing up to a business conference in your pajamas with a bedroom in the background can come across as rude. Fortunately, the majority of videoconference programs offer a virtual background option. If there is a reputable dress filter app, it can also be employed. Even so, if the bottom portion is concealed from view, it might not be essential to dress completely (see **Figure 1.7**).



Figure 1.7 Man doing online presentation half-dressed

Source: [Freepik](#) (Licensed)

1.1.8 E-safety

Many people now depend on the internet as a constant source of information. We can access information kept on distant servers via the internet. At the same time, people in remote locations may have access to our devices and personal data. It has been said that nowhere on the internet is safe, but it doesn't mean we need to turn off the internet altogether. We can take the following steps to increase internet security ([McNally, 2022](#)).

- 1) Use strong passwords and distinct ones for different services. If possible, enable multi-factor authentication to offer an extra layer of security.
- 2) Be careful when sharing personal information with others.
- 3) Avoid connecting to unsecured public Wi-Fi.
- 4) Turn off Bluetooth when not in use.
- 5) Avoid browsing suspicious websites and only download files from trusted agencies.
- 6) Install an antivirus program, particularly if you are using Windows.
- 7) Verify the privacy settings on social media platforms. Make it more difficult for outsiders to obtain your personal information. Choose to share information only with people you know.

1.2 Digital Citizenship

Nowadays, almost everyone utilizes social media and the internet. Your participation in online communities and internet activities marks the beginning of your digital citizenship. The Cambridge Dictionary defines a digital citizen as "someone who is skilled in using the internet in order to communicate with others, buy and sell things, and take part in politics, and who understands how to do this in a safe and responsible way. "

1.2.1 Digital natives and digital immigrants

Digital natives were born in a digital world with technology all around them. Often, they have been using digital devices (such as smartphones or computers) from an early age. Children learn quickly, so they are proficient in technology and grow up to be digital citizens. Because they are naturally curious, digital natives continuously browse the internet for fresh knowledge and gather information from numerous sources.

Digital immigrants begin to learn and use technology in adulthood or into old age. Adult education is thought to be less successful than that of youngsters. As a result, digital immigrants frequently struggle to use technology. It's normal to experience fundamental issues, like losing a password or transferring funds to the wrong accounts.

The distinction is merely an assumption, though. Other elements, such as social effects and access to technology, can influence one's capacity to use technology ([Wang et al., 2013](#)). Furthermore, even tech-savvy people occasionally misuse technology. This is why using technology responsibly has been addressed multiple times during this course.

1.2.2 Online identity and law in cyberspace

Many people communicate with one another online without ever having met in person. Various persons are known to us based on their online profiles or posts. Sometimes, people's online identities don't accurately represent who they are in real life. Some profiles, known as avatars, are made using false information and are not connected to real persons. Many believe online identities are fictional and their creators are not obligated to assume responsibility. The idea that the law does not apply in cyberspace is not accurate. Internet users remain in at least three jurisdictions ([Trout, 2007](#)) as follows:

- 1) The law of the state/country in which the user resides.
- 2) The law of the state/country of the person whom the user transacts.
- 3) The law of the state/country where the server or service provider is located.

Online service providers frequently underline that account holders are fully responsible for any acts under their accounts as well as any content they import into the system.

1.2.3 Being a good digital citizen

Using the internet safely is only one aspect of being a good digital citizen. It also entails taking responsibility and treating others and oneself with respect. Being a good digital citizen makes our online community a pleasant place for everyone, regardless of what you post on social media, participate in online discussions, or do in any other way. The following are some suggestions for becoming a good digital citizen ([Allen, 2016](#); [Grossel, 2020](#)):

Think before posting

We can disclose things on social media that we might not feel comfortable discussing in person. Because posting messages is so simple, we occasionally let our feelings rule our judgment. A great way to keep the atmosphere in online communities pleasant is to think before posting.

Check before sharing

Users can frequently post on social media without having to get their content verified. Creators can monetize their content on several platforms, and the revenue grows as more people view and share it. Because of this, many content producers now prioritize appealing to their audience over accuracy or usefulness. Before sharing any content, responsible users will typically think it through critically to determine its validity. It is suggested to gather data from various sources to reduce bias.

Protect your privacy

Social media users can change the privacy settings on their accounts to control who has access to their content. Only the designated user accounts should have access to content that is restricted to particular user groups. The same goes for private information that could be used against the account holder, such as sensitive images, email addresses, and mobile numbers.

Use caution when filling out forms with personal information or granting software access to user account data. Some businesses share client data with third parties, resulting in spam, unwanted contact, and fraudulent transactions. Online service providers are required by law to clarify their privacy policies, which outline how user data will be saved and used. Before utilizing the service, users should be aware of their ability to limit access to personal data. This includes the option to approve or disapprove the sharing of user data with other organizations, its use for marketing communications, and the right to request the deletion of personal data from the system. Changes may be made to the privacy settings and policy so that users must regularly check for updates.

Respect the rules

All users must comply with the rules and guidelines of websites like Facebook, Twitter, school forums, and others. Policies are typically announced in the "Site Policy" or "Site Rules" section. Sharing copyrighted content is prohibited on most platforms. Sites with many young users usually forbid profanity and adult material (e.g., drugs, violence, and nudity). Any content published on YouTube is subject to the Children's Online Privacy Protection Act (COPPA) which prohibits the publisher from collecting user data if the content is targeted at a child audience ([Federal Trade Commission, 2020](#)).

Secure your account

Create a password that is challenging for others to decipher. A strong password should contain a mix of uppercase and lowercase letters, numbers, and symbols. It shouldn't contain any information about you, such as your name, ID number, phone number, or date of birth. A password shouldn't be any dictionary words. It's best to use unique passwords for each service, especially the primary email. If you lose access to a particular service, you will need your primary email to regain your account. Passwords must never be written down or shared with anybody.

Many online services today implement multi-factor authentication. In order to sign in or confirm a transaction, the system will request more than one personally identifiable information (see **Figure 1.8**), including:

- 1) What you know -- such as a password or an answer to a secret question
- 2) What you have -- such as a one-time password (OTP) sent to your phone, an authenticator app, or a dongle (a small USB device that contains a license key)
- 3) What you are -- by scanning biometric data (e.g., face or fingerprint) and comparing it with the sample in the database



Figure 1.8 Multi-factor authentication

Source: Own work using [Canva Education \(Terms\)](#)

Secure your device

Keeping our devices safe is important. Current operating systems can identify and handle malware efficiently, provided that the user doesn't alter the system or bypass the security (known as jailbreaking or root). People who use older-version Windows may strengthen their security by installing antivirus programs, as they are the major targets of cyberattacks.

Hackers are currently making innovative efforts. They install a packet sniffer behind a Wi-Fi hotspot and attempt to connect to unsecured Bluetooth devices. Hardware can occasionally be the source of a cyber threat. According to reports, a group of hackers created a mobile charging cable that can sniff data and transmit it back to the attacker using a built-in wireless adaptor. There have also been instances of USB connectors in public charging stations having data sniffers installed. In order to keep the device secure, it is advised to leave Bluetooth off and avoid using public chargers or connecting to untrusted Wi-Fi networks.

Do not open suspicious files or links

Malicious software and codes are often hidden in executable files (e.g., EXE), enclosed in an archive (e.g., ZIP or RAR), or embedded in macro-enabled office documents (e.g., DOTM, .XLSM). An attacker may change a file name and/or icon to disguise it as an ordinary, harmless one. The actual file type can be viewed in the file properties or info (see **Figure 1.9**).



Name	Date modified	Type	Size
 New folder	4/9/2565 15:23	Application	1,391 KB

Figure 1.9 Executable file disguised as a folder

Source: Own screenshot showing Windows folder and file

We should only download files, especially programs, from trusted sources. Files sent by others should be verified as safe before opening. Portable USB drives can spread malware rapidly and widely. Cloud drive is a safer way to save and exchange files as it automatically scans files for potential threats.

Browse with care

Sometimes cyber dangers come from visiting malicious websites. Digital citizens should know with common sense what kinds of websites we should not open. Searching for illegal things like online gambling, illegal loans, pornographic content, pirated software and movies should be avoided at all costs. These websites usually have malicious code that can access user data covertly or take over a device. They occasionally deceive viewers into clicking annoying ads or entering sensitive data, such as passwords and credit card information. This is another reason to avoid using the same password for multiple services.

There are cyber-attacks that disguise email messages to appear as though they were sent from service providers or government agencies. These messages attempt to persuade readers that they are in trouble and must act immediately by clicking on the attached link. An example of a phishing email can be found in **Figure 1.10**. The picture shows abnormalities like improper language usage, grammar and spelling mistakes, and ambiguous logo graphics. It is unlikely that a large corporation has made such typical errors. If we look closely at **Figure 1.10**, we can see that the email was sent from a different domain, not the one officially used by the company. This crucial detail enables us to determine whether the email is spam or phishing.

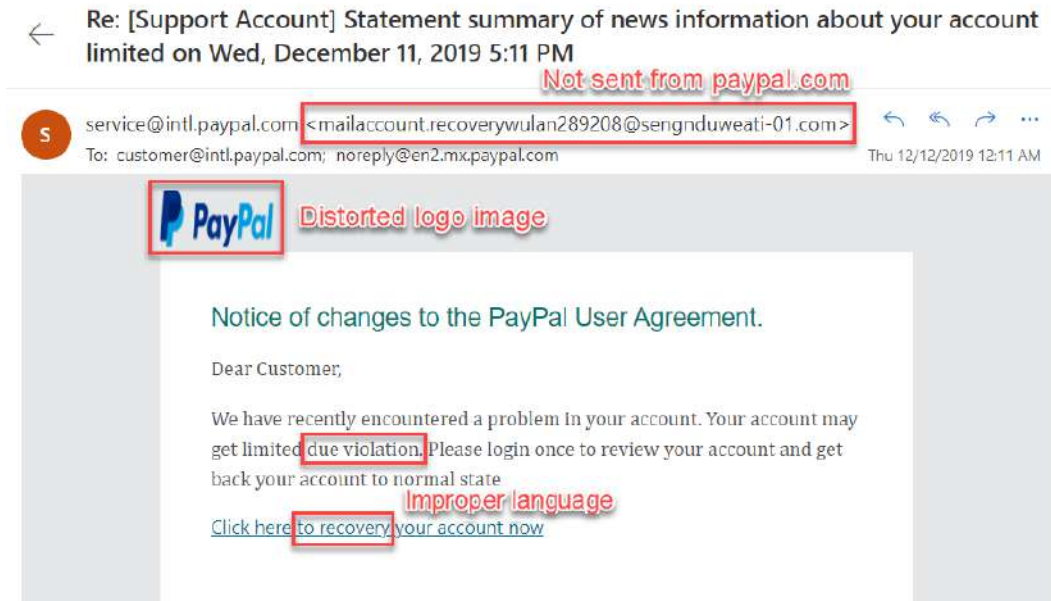


Figure 1.10 Phishing email

Source: Own screenshot showing an email message, contain trademarks

Sometimes counterfeiting is so subtle that it's hard to distinguish between the two. You shouldn't open the associated link if you're not confident the email is authentic. Instead, enter the URL to go straight to the provider's official website. Additionally, ensure that it starts with "HTTPS," which denotes an encrypted connection between your web browser and the web server. You may also tell that the connection is secure by looking for the "lock" icon in the address bar (see **Figure 1.11**).

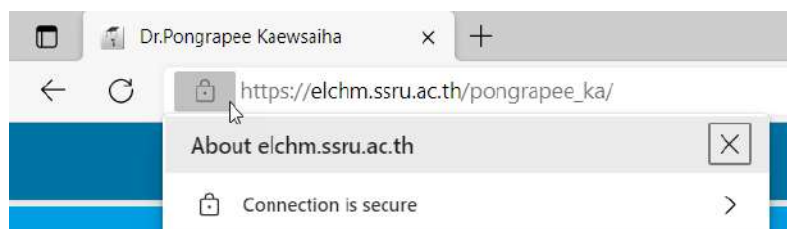


Figure 1.11 Secured web page with HTTPS

Source: Own screenshot showing a browser address bar

Be prepared to deal with cyberbullying

The primary goal of cyberbullying is to harass or upset the victim. Therefore, the key to handling that is to avoid giving an instant response because doing so will indicate that the harassment was effective. Instead, save proof like screenshots, report or flag offensive posts, and alert the community moderators ([ReachOut, 2022](#)). Blocking dangerous users and avoiding revisiting poisonous posts might be beneficial. It's crucial to not disregard hostile behavior to avoid similar situations from occurring in the future for both you and other people.

Manage your screen time

Digital citizens often spend part of their lives in front of a screen, working, studying, socializing, and entertaining. However, too much screen time might harm your health, emotions, and cognitive growth. Some of the challenges include eye strain, back and neck pain, sleep troubles, and difficulties with kid behavior and learning. In addition, excessive screen time drives social issues like obesity and lack of time for other activities.

[Kennedy \(2020\)](#) suggested that children under 18 months should not have screen time. Children between 18 and 24 months can use screens, but it should only be for educational purposes and only when supervised by an adult. Children 2 to 5 years old can begin using screens for entertainment, but only for a maximum of one hour during the week and three hours on the weekends.

For older kids and adults, there are no set limits on how much time they can spend on screens. According to general guidelines, screen usage shouldn't disrupt mental or physical health, exercise, sleep, job, friendship, and family relations.

1.3 Digital Technology in Everyday Life

Digital technology has been utilized in many aspects of modern life, including communication, information-seeking, transactions, buying and selling goods, and entertainment. Digital technology has a long history since humans introduced computer systems to assist in specific tasks. Technology has transformed the industry, the business sector, and other related fields.

1.3.1 Digital Revolution

The Digital Revolution, also known as the Third Industrial Revolution, began in the second half of the 20th century when humans began to adopt computers and electronic devices (see **Figure 1.12**). These have transformed traditional manufacturing into automation. Analog devices, such as phones, cameras, and cassette players, were gradually replaced by their digital counterparts.

The first Digital Revolution (also known as Digital 1.0) marks the beginning of the information age and the internet. That was when people began to engage in online activities, such as sending emails, surfing the internet, searching for information, publishing news, and advertising products online. The early internet used Web 1.0 technology, where websites primarily consisted of static web pages connected with hyperlinks. Communication is one-way mainly (read-only), where the service provider stores web components on the web hosting. Viewers establish a connection and bring the information to display on their end-user devices.

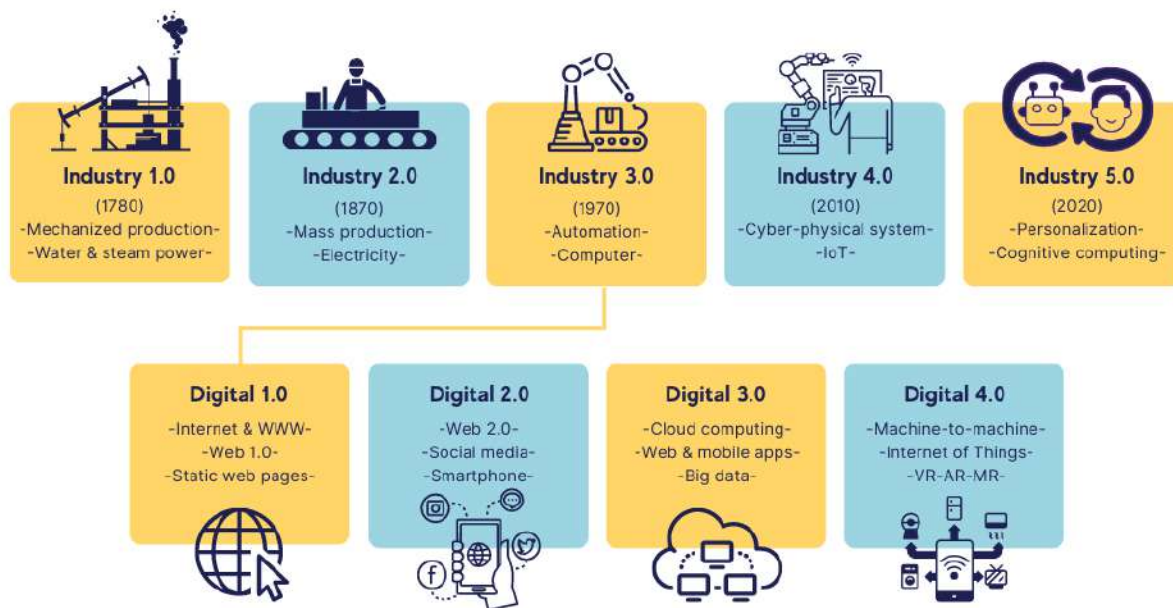


Figure 1.12 Industrial and Digital Revolutions

Source: Own work using [Canva Education \(Terms\)](#)

After the launch of Apple iPhones in 2007, people's mobile usage habits shifted from voice to data communication. Web 2.0 technology supports dynamic web pages that are rendered in real-time. This marked the beginning of the social media era. The introduction of broadband internet has opened up new opportunities for digital business (e.g., video-on-demand) by enabling smooth video streaming.

A significant shift in consumer behavior was the catalyst for the third revolution. Customers frequently seek out compact, high-mobility devices. Desktop computer usage has drastically decreased, but mobile phone usage has skyrocketed. Mobile application development has emerged as a new profession to accommodate the expanding need. Smaller size, meanwhile, means less room for data storage. Thankfully, communication technology has advanced concurrently. Data can be synced between users' devices and in the cloud. In addition to storing files, cloud computing enables server-side processing and program execution. Users don't need to install any additional software to access the online application straight through their browser. Additionally, because of the enormous volume of data that is communicated and kept online, businesses can utilize big data to evaluate user behavior and locate potential consumers.

The fourth digital revolution was sparked by the idea of giving previously incapable machines the ability to think and process information. People can now remotely operate, monitor, and program devices utilizing the cloud app. This technology is called the Internet of Things (IoT). In addition, Virtual technology (VR, AR, and MR) allows people to communicate and work remotely, even with complex tasks. Details will be given further in **Chapter 2**.

1.3.2 Digital Transformation

Digital transformation (DX) is the process of using digital technology to create or modify business processes to enhance the customer experience and meet the changing market demands. The following processes may be included in digital transformation:

Digitization

Digitization is the conversion of analog data to digital. Digitization typically refers to the transition from using hard copies, such as paper documents or cassette tapes, to soft copies, such as PDF documents or MP3 music files. Digitization is the first step in digital transformation. Organizations are unable to undergo a digital transformation if they cannot deny the use of paper documents.

Digitalization

Digitalization is using digital technology to simplify the work process. In a typical workflow, documents are circulated among team members for editing. Making the switch to sharing revisions over the cloud enables real-time collaboration, reduces document format distortion, and eliminates redundant work. The digital signature is another example that can simplify the workflow and enhance reliability (see **Section 8.3.2**).

Digital transformation

Digital transformation requires organizations to review all the business processes, from internal systems to customer interactions. This is to create a strategy to change certain processes to help the company make better decisions, increase productivity, or create a better customer experience.

Digital transformation can occasionally entail starting a brand-new company. Netflix first started its business with mail-order DVD sales and rentals. As the number of countries with broadband internet access increases, Netflix has expanded its streaming media and video-on-demand operations to more than 190 nations.

Marc Benioff ([Salesforce, 2022](#)) said that digital transformation begins and ends with customers. Therefore, organizations must adjust as consumer behavior shifts. Recently, people have placed online orders for things because it is convenient and requires no traveling. However, many consumers must consider carefully before making an online purchase of certain goods, such as furniture. They cost a lot of money, and there is no guarantee that they will fit in the area and blend in with the existing ones. The IKEA Place app, which uses augmented reality, allows users to place virtual 3D models in their own space (see **Figure 1.13**). Customers may then preview how the product will fit in the space and how the room will appear once it has been fitted.



Figure 1.13 IKEA Place

Source: [YouTube](#) (Fair use)

Businesses that fail to undergo digital transformation will eventually lose their competitive advantages. With a long-standing market share, Kodak was the most well-known camera producer and distributor in the entire world. After the invention of digital cameras, people started realizing that digital photography is more affordable than traditional film photography with comparable image quality. However, Kodak made an effort to show that people prefer printed photos over digital ones. The business fully disregarded the criticism from the industry and the market as it persisted in emphasizing the marketing of film cameras. When Kodak started selling digital cameras after realizing it could not withstand the flow of change, it was already too late. Long before then, a lot many significant corporations entered the industry. This caused Kodak to go bankrupt.

1.4 Conclusion

The ability to use digital technology effectively, ethically, and safely is just one aspect of being a good digital citizen. The ability to choose the right technology for the job is the first step on the road to excellent digital citizenship. Technologies like online collaboration greatly reduce operational procedures and mistakes. Effective search also enables us to pick out the data we require from the billions of search results.

People can swiftly spread information using social media, typically without the requirement for screening or moderation. Determining whether the information viewed is reliable or not, then, requires the capacity to think critically. The issue of cyberbullying is comparable to that of false news. If it is occurring to you, keeping the evidence for future legal action is a solid defense instead of reacting right now. Never forget that anything we do online has the same legal implications as anything we do in the real world. It is preferable to treat people like we want to be treated.

Although there is no place on the internet that is secure, we can avoid doing anything risky. Setting up a strong password or using multi-factor authentication can help protect personal data to some extent. Avoid unsafe websites and do a thorough investigation before providing sensitive information.

Consumer behavior has changed as technology develops. Businesses need digital transformation to survive the intense competition. Companies must expand their services to be mobile-compatible as consumers switch to mobile platforms. Certain businesses, such as online meetings, virtual events, and third-party food delivery services, have evolved due to certain consumers' need to work from home.

Wrap-up Activity

1) Analyze some inefficient processes, such as group projects and presentations, and consider how digital technology can help increase efficiency.

2) Scan the first few pages of your email inbox and see if there is any potential spam or phishing mail.

3) Experiment with search engines to find something specific, such as a branded product with a particular package size. Determine which search terms provide the most relevant results for your case.

4) Think about what made you feel uncomfortable or insecure on the internet and how you dealt with it. Review what actions made the situation better or worse.

5) Take a look at nearby businesses or organizations that have been through digital transformation. Consider why they had to do it and what improvements they have made.

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Lesson Plan: Chapter 2

1. Topics

- 1) The three digital pillars
- 2) Extended Reality (XR)
- 3) Intelligent technology applications

2. Learning objectives

By the end of this chapter, students should be able to:

- 1) Name some intelligent technologies used in everyday life and used by government, business, and academic sectors.
- 2) Describe the basic principles of IoT, big data, and AI.
- 3) Describe how VR, AR, and MR work.
- 4) Describe how intelligent technology improves the quality of life and increases competitiveness.
- 5) Choose the right smart device for the job.

3. Teaching methods and learning activities

Introduction

- 1) Demonstrate some smart devices, such as Wi-Fi outlets and IP cameras.
- 2) Illustrate how intelligent technology is all around and will replace traditional devices and works.

Presentation

- 1) Explain the three digital pillars and demonstrate the use of smart devices.
- 2) Describe three types of Extended Reality and demonstrate some applications.
- 3) Illustrate how people apply intelligent technology in everyday life, including those used by governments and businesses, to enhance the quality of life and increase competitiveness.

Conclusion

- 1) Give the lesson summary.
- 2) Students review the lesson from the interactive courseware.
- 3) Students complete the chapter quiz.

4. Teaching materials

- 1) Instructional material: GEN0309 Digital Life
- 2) Presentation (PPTX)
- 3) Courseware (Moodle SCORM)

5. Assessment and evaluation

- 1) Participation in the class, online meeting, live stream, or meeting record
- 2) Participation in the discussions and demonstrations
- 3) Courseware attempts
- 4) Quiz score

Chapter 2

Intelligent Technology

Before the digital revolution, many tasks required manual labor. Producing goods or even something as simple as turning on or off a light had to be done on-site. These fundamental activities have been replaced by technology, which is now more sophisticated and able to make decisions on behalf of humans. [Baysal & Ülkü \(2022\)](#) define intelligent technology as the "application of scientific knowledge performing decision-making functions that would formerly have required human intervention." In this chapter, we shall explore how intelligent technology has altered our way of life.

2.1 The Three Digital Pillars

Although there are numerous theories regarding the three pillars of digital transformation, an eye-catching idea from a technological standpoint suggests that the three pillars are the Internet of Things (IoT), Big Data, and Artificial Intelligence (AI) ([Team Computers, 2019](#); [Internet Governance Forum, 2020](#)). Given how heavily these systems rely on user data, this is consistent with the notion that "digital transformation begins and ends with customers" ([Salesforce, 2022](#)). Intelligent technology is no longer considered to be the leading edge. As customer behavior changes, it has become a means of survival for businesses.

2.1.1 Internet of Things (IoT)

The goal of the Internet of Things is to make regular devices—which aren't normally thought of as computers—able to communicate and process data. Installing a timer to regulate the on-off is such a way to customize simple equipment like switches, plugs, or fans. By adding sensors, relay switches, and network adaptors, IoT has further increased the gadget's capabilities. This enables users to monitor and operate the device remotely as well as retrieve data from the device, such as temperature, power usage, and on-off state.

Mobile applications are frequently used in conjunction with the Internet of Things to increase convenience. **Figure 2.1** illustrates the Philips Hue smart outlet and lighting. Using the mobile app, users may turn on, dim, or even alter the color of the lights. These products are frequently marketed as smart plugs, Wi-Fi outlets, and smart lighting. **Figure 2.2** shows a smart IP camera where users have wireless access to real-time recordings and images. As shown in **Figure 2.3**, there are many different types of smart devices, such as smart switches, smart thermostats, and smart door locks.



Figure 2.1 Smart outlet and lighting

Source: [Google Home](#) (Fair use)



Figure 2.2 Smart IP camera

Source: [Freepik](#) (Licensed)



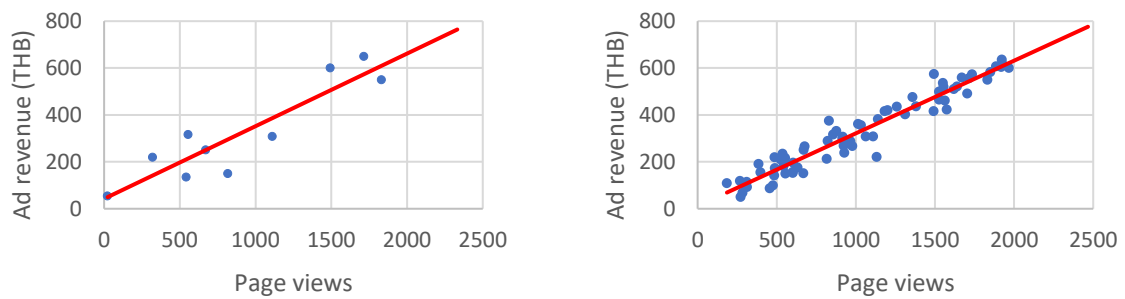
Figure 2.3 Smart devices

Source: [Freepik](#) (Licensed)

IoT does more than just turn on and off devices. Automation is infinitely flexible since data obtained from the device can be taken into the algorithm. For instance, the user might program the light to change to blue when the interior temperature falls below 25 degrees Celsius or to activate the spotlight when a motion is detected. This capability comes in handy in business and municipal management (See Section 2.3).

2.1.2 Big Data

To understand big data, we first need to understand basic statistical principles. Figure 2.4 shows a simple linear regression that was used to forecast advertising income depending on the volume of website visitors. We can observe that larger data produce more precise forecasts.



Smaller data – lower accuracy

Bigger data – higher accuracy

Figure 2.4 Small and big data – Linear regression example

Source: Own work using Excel

Humans produced about 2.5 quintillion bytes of data daily in 2018 (Marr, 2018). Data processing is the least challenging when dealing with structured data, such as transactions and employee records. This is because they are categorized by type (e.g., text, numbers, percentages, hyperlinks, etc.) and kept in tables or databases.




Unfortunately, the vast majority of data in the world is unstructured (see Figure 2.5). They include social media posts consisting of casual greetings, pictures, and quick videos. Another example is data from CCTV or traffic cameras, which are just large video files. We need to turn these unstructured data into usable information to extract key information, such as customer interest, hidden relationships, and violations.

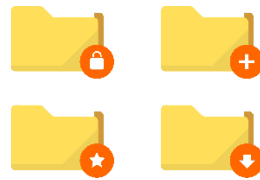
One of the main issues with big data is that we require a lot of storage space, particularly for video files. Processing and analytics are additional problems, as data are useless unless they are converted into valuable information. Complex data cannot be handled or processed using typical hardware, software, and algorithms, in contrast to structured datasets (sales, transactions, etc.). For instance, sophisticated algorithms, such as image processing and pattern recognition, are needed to extract patterns from social media posts or data from surveillance videos.

	Dec-15	Jan-16	Feb-16	Mar-16
Budget Total	10,045	10,000	45,222	45,207
Personnel				
Wages	13,084	13,000	10,826	13,603
Payroll taxes	245	247	174	1,953
Salaries	382	423	178	512
Commissions and benefits	0	2,350	100	25
Personnel Total	12,091	16,020	11,178	16,593
Marketing Research				
Web Research	0	0	0	0
Independent Research	0	0	0	0
Print Research Fees	0	0	0	0
Market Research Total	0	0	0	0

Structured Data




Often numbers and labels organized in a tabular form

-  Financial transactions
-  Sales records
-  Employee database



Semi-structured Data

Various forms of data loosely organized into categories

-  Emails organized by senders
-  Tweets organized by hashtags
-  Folders organized by file types



Unstructured Data

Raw data that are not organized into any framework or model




-  Documents, posts, reviews
-  Images, videos
-  Sounds, audio

Figure 2.5 Data types

Sources: Own work using Word, contain images from [Freepik](#) (Licensed)

Modern technology has made it less expensive to store and process data. Big data management is frequently done using cloud computing because of its high processing power and bandwidth. Businesses that require real-time analytics can use the cloud. For cost-effectiveness, the cloud is also scalable for both computing and storage. Software with the capabilities shown in **Figure 2.6** is designed to process big data. These features include batching the data into smaller amounts for processing by smaller processors, removing unnecessary inputs, and sorting the output.



Figure 2.6 Big data software

Source: Own work using PowerPoint, contain trademarks

To develop winning marketing strategies, marketers must examine insight data. Big data analytics are necessary for businesses to comprehend market trends, analyze client behavior, and assess the market's condition and level of competition. There is a high demand for individuals who can manipulate enormous amounts of data to discover meaningful and practical information for the organization.

The 5 V's of big data

The 5 V's are essential characteristics of big data that assist data scientists in maximizing the value of their data and assisting organizations in becoming more customer-focused ([Gillis, 2021](#)).

1) **Volume** describes the quantity of data that is available. Having a lot of initial data is equivalent to having a lot of resources.

2) **Velocity** refers to the speed at which data is created and moved. According to [Wise \(2022\)](#), about 720,000 hours of video content are uploaded to YouTube daily. Viewers watch YouTube videos at a rate of 250 million hours per day in 2022, for which content creators will earn ad revenue based on views and clicks. Amid high competition in the digital era, businesses need to present what is trending to compete in the media space. High data velocity is essential for companies to make quick and accurate decisions.

3) **Variety** refers to the diversity of data types. Executives need to rely on both internal and external data, both structured and unstructured, to make decisions. Customer reviews and what they post on social media are just as important as accounting information, which all must be considered.

4) **Veracity** means the quality and accuracy of the initial dataset. The data collected may be missing, inaccurate, or unable to provide valuable insights. For example, surveys tend to have a number of uncooperative respondents who will respond randomly. The challenge lies in screening credible datasets for the analysis.

5) **Value** means the usefulness of the data. It also refers to what organizations can do with the data they collect. Compared to gold mining, we may collect a large volume of ore, but that doesn't mean all of them can be converted to gold. Likewise, in a large amount of data available, only a small fraction can be processed into valuable information.

2.1.3 Artificial Intelligence (AI)

There are numerous ways to define artificial intelligence (AI). According to one perspective, artificial intelligence (AI) is the process through which we give machines the ability to act or decide, much like an intelligent human being ([Berente et al., 2021](#)). The intelligence of humans (and some animals) may arise from remembering things and their relationships. Similarly, traditional computing works by providing a function (or model) and input data, and then the system will process and give output (see [Figure 2.7](#)).

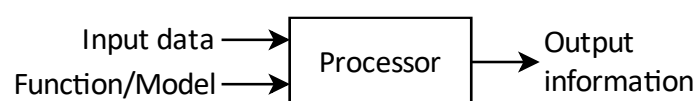


Figure 2.7 Traditional computing

Source: Own work using [diagrams.net](#)

Intelligence can be developed by learning what is right and wrong and avoiding making the same mistakes again. In an experiment done in 1929 (Rye et al., 2016), rats were put in a maze and challenged to find their way to food (see Figure 2.8). The same group of rats attempted to navigate the maze again a day later, and they did so with fewer mistakes. After Day 11, the majority of the rats could navigate to the food without making a single mistake. It appears that those lab rats could develop a maze pattern via trial and error (see Figure 2.8).

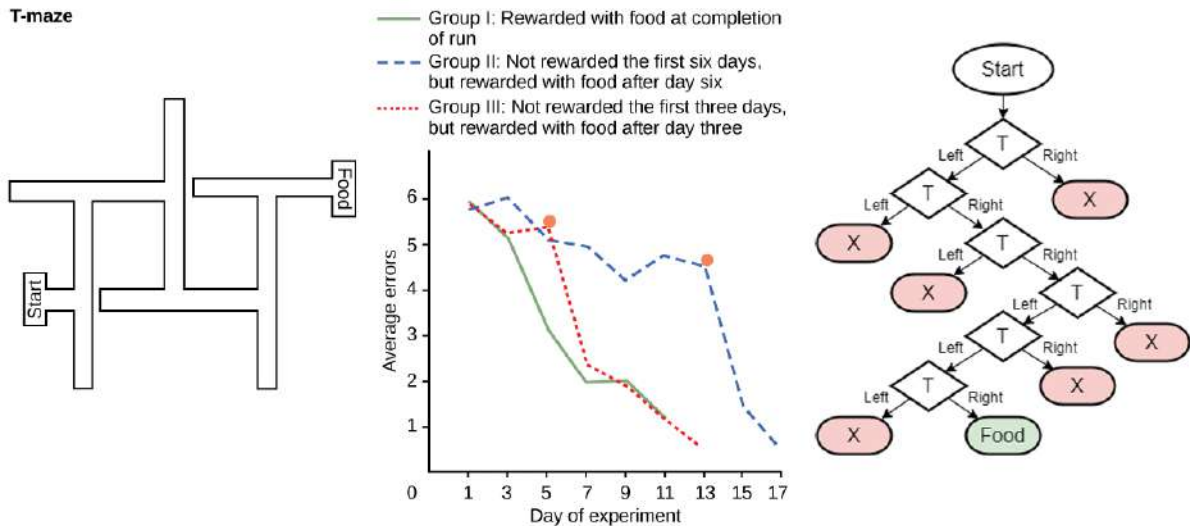


Figure 2.8 Rat maze experiment

Sources: Own work using diagrams.net, contain images from OpenStax (CC BY)

Machines may learn from errors using the same theory. Figure 2.9 depicts a simulation of an autonomous vehicle in which simulated vehicles collided often during the initial runs. The software would keep track of those faults and set a condition to prevent similar errors in the future.

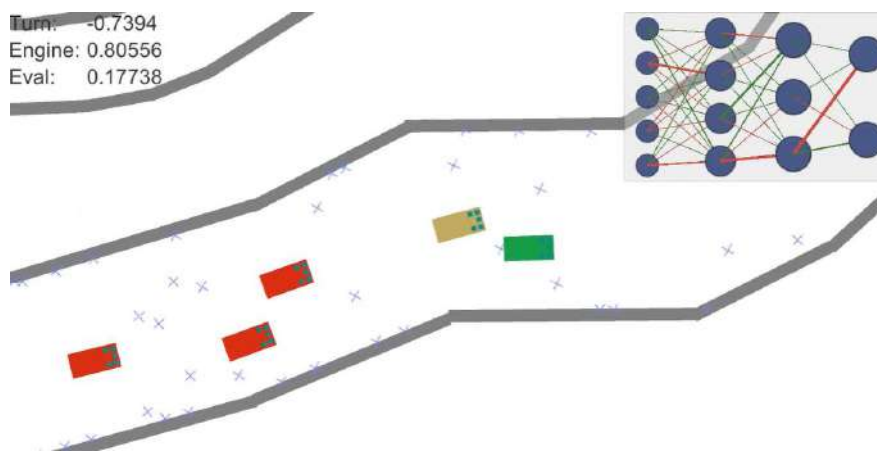


Figure 2.9 Autonomous vehicle simulation

Source: YouTube (CC BY)

As seen in **Figure 2.10**, data science and big data have several concepts and resources in common with artificial intelligence. AI is a practical solution for handling big data. The graphic demonstrates that certain AI operations only deal with small data, and some big data analyses do not need AI.

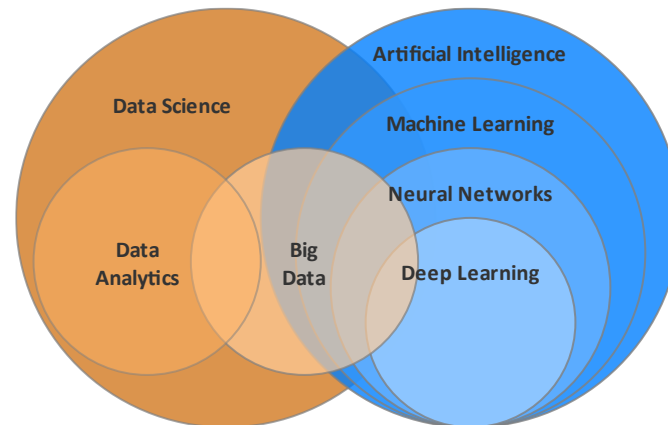


Figure 2.10 AI and data science

Source: Own work using diagrams.net, adapted from [Yalçın \(2021\)](#)

2.1.3.1 Machine learning

Machine learning is a sub-discipline in the field of artificial intelligence. Machine learning can create mathematical models to make predictions or decisions based on previously collected and recorded data, known as "training data."

Supervised learning

Machine learning can produce an explicit output if the training dataset is labeled. Let's imagine that we have a variety of user profiles with information regarding introverts and extroverts (see **Figure 2.11**). Each type has features that can be extracted using machine learning. The system will compare the profile of an unknown individual with the training data to determine if this new person's characteristics are more similar to those of an introvert or an extrovert. This method is referred to as "supervised learning." Regression and classification are two instances of supervised learning algorithms.

Unsupervised learning

Machine learning can only group the data based on similar characteristics when the training data are unlabeled. Let's assume there is no label in the scenario above designating introverts and extroverts. In such instances, machine learning will put people in groups based on common attributes like friend counts, post counts, and posting frequency. The results could be multiple models that require manual labeling and evaluation by human

users to see whether they are meaningful (see

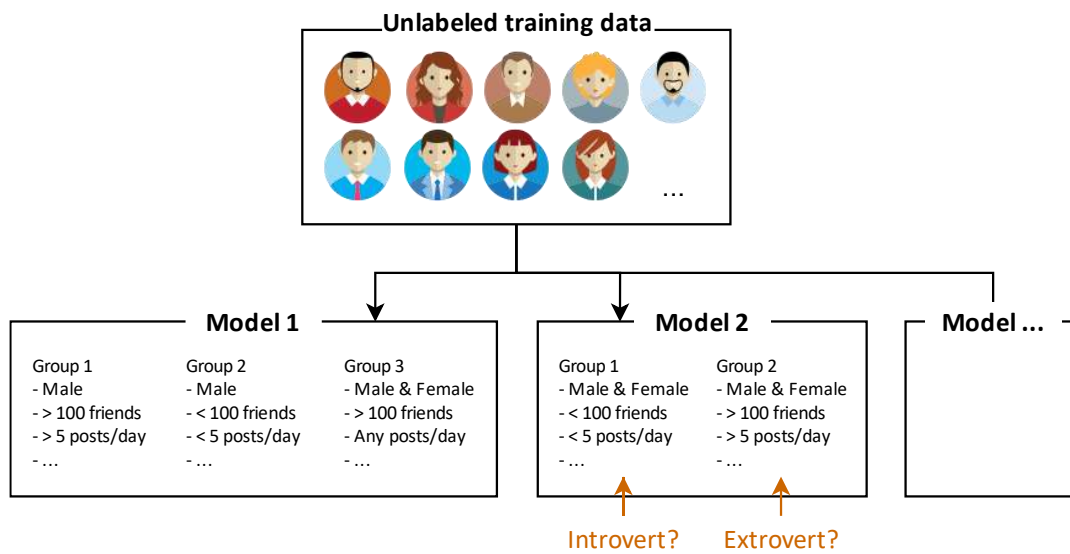


Figure 2.12). This method is referred to as "unsupervised learning." Examples include clustering and dimension reduction.

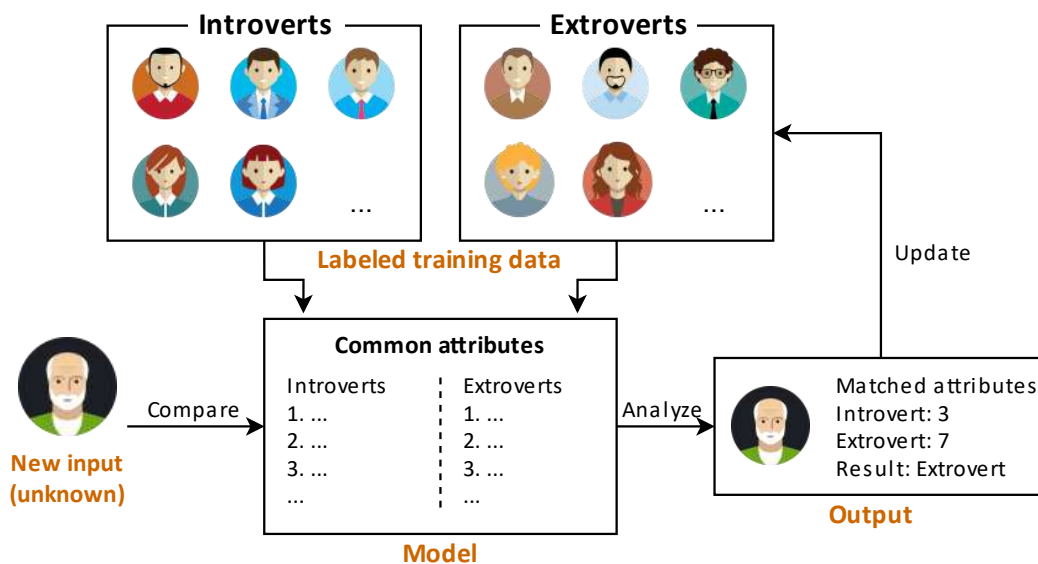


Figure 2.11 Supervised learning

Source: Own work using [diagrams.net](https://www.diagrams.net)

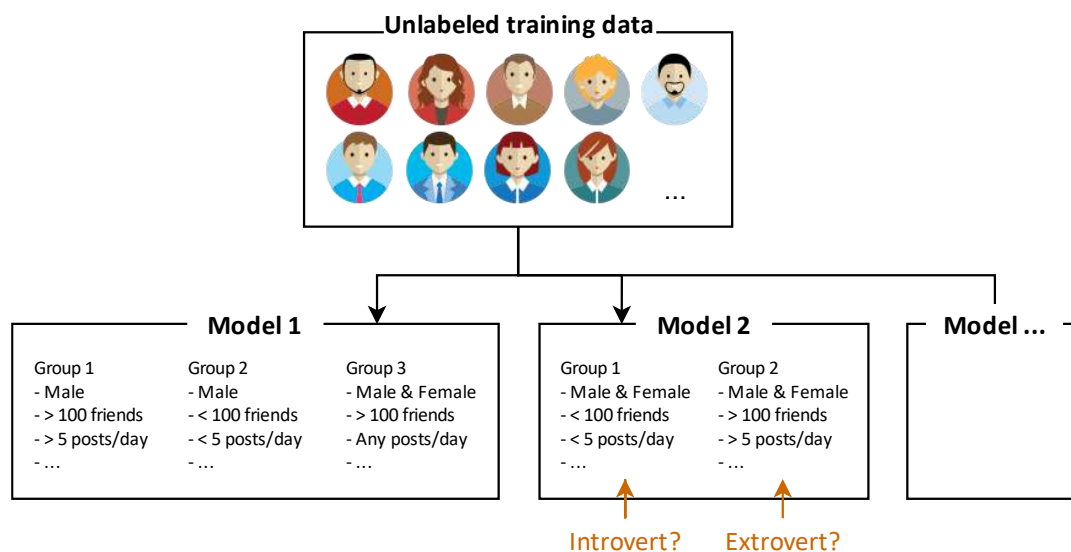


Figure 2.12 Unsupervised learning

Source: Own work using diagrams.net

Semi-supervised learning

Semi-supervised learning combines a small amount of labeled data with a large amount of unlabeled data during training.

Reinforced learning

Reinforcement learning is a machine learning training method that rewards desired behaviors and/or punishes undesired ones (Carew, 2021). This method is similar to how we train humans and some animals. According to Figure 2.8, appropriate rewarding behavior can stimulate learning.

2.1.3.2 Neural networks and deep learning

Neural networks, also known as Artificial Neural Networks (ANNs) or Simulated Neural Networks (SNNs), are a subset of machine learning. ANNs mimic how human neural networks work by receiving input from sensory nerves (such as the skin and nose), sending it through the body's neural networks to be processed, and then returning the results. For instance, if we touch something hot, the sensation will be conveyed from the skin to the brain for processing through human neural networks. As a result, brain networks will tell the muscle to shift that body part away from the object as a warning of the risk. This action takes place automatically and relatively immediately. Other neural network components will also note the object's look, color, and smell and classify it as "hazardous." The body will respond to the possible threat the next time we see or smell such an object, even if we don't touch it.

Artificial neural networks consist of an input layer, at least one hidden layer (ANNs with multiple hidden layers are called "deep learning"), and an output layer (see Figure

2.13). There are weights and thresholds assigned to each link between nodes. A node is activated, and the data is sent to the network's next layer if its output rises beyond a predetermined threshold. The variable's weight indicates its significance, with a higher weight indicating a greater impact on the result.

Neural networks rely on training data to learn, improve accuracy, and speed up processing over time. Neural networks are used in speech recognition, image recognition, and search algorithms.

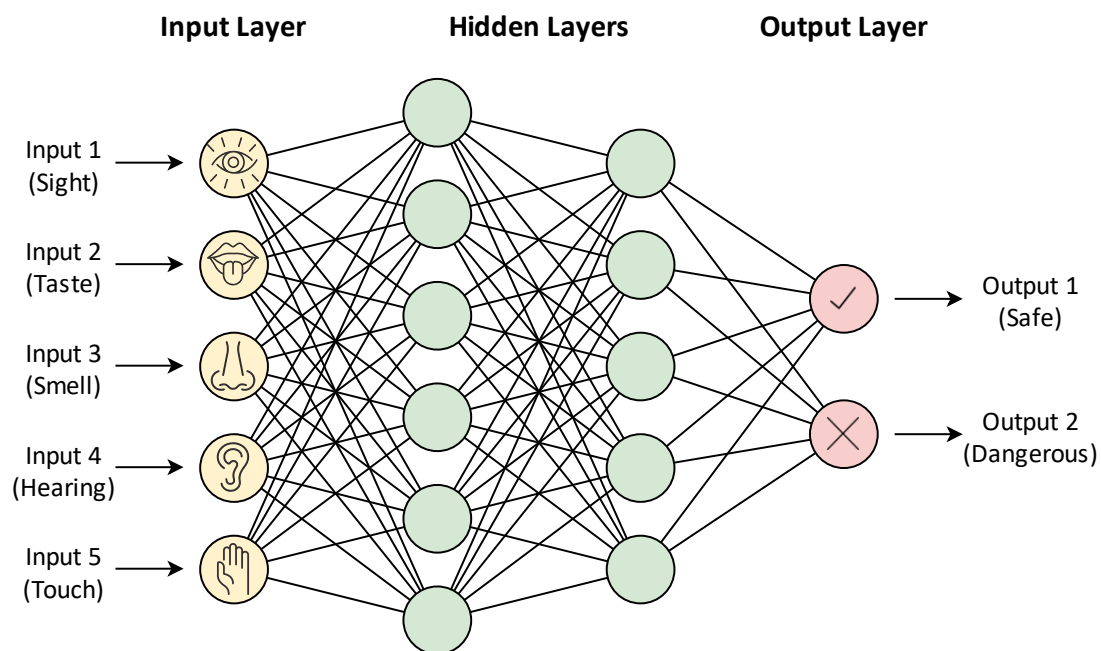


Figure 2.13 Neural networks simulating human sensory responses

Source: Own work using diagrams.net

2.2 Extended Reality (XR)

Extended Reality (XR) is a field of computer technology and wearables that integrate real and virtual environments with human-machine interactions. XR is an umbrella term that encapsulates Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and related areas ([Qualcomm, 2022](#)).

2.2.1 Virtual Reality (VR)

Virtual Reality (VR) is a technology that allows users to interact with a computer-simulated environment ([Mandal, 2013](#)). Virtual environments may be simulated from real places or created purely by the creator's imagination.

3D and 360° VR

In 3D VR production, virtual environments are created using graphic design software comparable to 3D game development. The end result is a three-dimensional

(3D) environment in which players can freely move. One of the well-known 3D VR platforms is Minecraft (**Figure 2.14a**), a sandbox video game where players can create a 3D environment using blocks and interact with it. Another illustration is the online 3D meeting and exhibition platform Spatial (**Figure 2.14b**), which enables users to explore virtual settings made by event planners.



a. Minecraft



b. Spatial

Figure 2.14 3D VR platforms

Sources: [Pixabay \(Terms\)](#), contain a screenshot from [Spatial.io \(Terms\)](#)

The 360° VR uses a specialized piece of equipment known as a 360° camera (see **Figure 2.15**) to capture a virtual environment. This unique camera records a sequence of omnidirectional/spherical photos or films. While viewers can pan the camera view around, there are restrictions on movement and navigation. A great example of 360° VR is Google Street View (**Figure 2.16a**). Facebook and YouTube can display 360° images and videos as well (see **Figure 2.16b**). There won't be many other platforms that enable 360° VR by 2022.



Figure 2.15 360° camera and spherical image

Sources: Wikimedia Commons [\(1\)](#) [\(2\)](#) (CC BY-SA)



a. Google Street View

b. YouTube 360° video

Figure 2.16 360° VR content

Sources: Own screenshots showing [Google Street View \(Terms\)](#) and [YouTube](#) (CC BY)

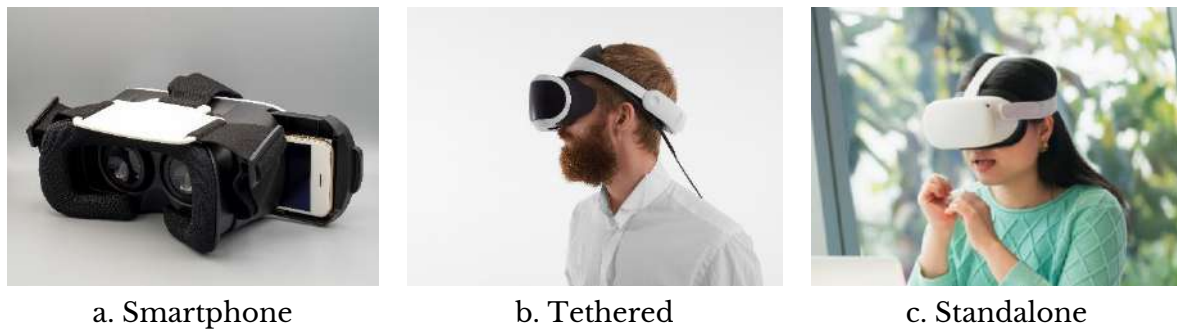
Headsets and controllers

Although most VR content can be viewed on regular computers and smartphones, using VR-specific hardware can significantly improve the user experience. VR headsets (also known as VR goggles or VR glasses) focus images on the left and right eyes to create a 3D illusion. The gear also keeps users from seeing the outside world. They experience a real sense of adventure as a result of this.

Prices for VR headsets range widely. The most affordable ones are those for smartphones (see **Figure 2.17a**). Every set consists solely of a frame and lenses. Additional headphones and control buttons are included with some variants. To connect, users must bring their own smartphones. The attached smartphone controls every feature, including the screen, processor, battery, gyro sensors, memory, and network connectivity. These VR headsets are ideal for smartphone users who simply want to try out the technology without making a significant investment.

Tethered VR headsets (see **Figure 2.17b**) must be physically connected to a computer by cables, such as HDMI and/or USB ([Aniwa Pte. Ltd., 2021](#)). Each set comes with a frame, lenses, display unit (e.g., built-in LED screen), gyro sensor, connection ports, and headphones (some models). Power and graphics are provided by the connected PC or game console. In reality, PCs are more powerful than cell phones. As a result, these headphones are appropriate for playing games with demanding graphics. But it can be challenging to set up, needs a place to play, and has a lot of unanticipated expenses.

Standalone or all-in-one VR headsets have a processor, sensor, battery, storage memory, and display built-in, so they don't need to be connected to a computer or a smartphone to function ([Aniwa Pte. Ltd., 2021](#)). Standalone VR headsets can be wirelessly operated to enjoy VR anywhere. Users simply need to download content to their headsets. Due to size and weight limitations, standalone VR headsets are less powerful and provide lower-quality graphics than the PC version (adding too many components will make them unwearable). In 2022, popular standalone VR headsets include HTC Vive and Meta Quest (formerly Oculus Quest) (see **Figure 2.17c**).



a. Smartphone

b. Tethered

c. Standalone

Figure 2.17 VR headsetsSource: [Freepik](#) (Licensed)

VR players cannot see real objects through their headsets unless additional sensors or cameras are added (see **Section 2.3**). Therefore, utilizing a joystick or gaming pad rather than a mouse and keyboard is more practical. Typical VR controllers are designed specifically for use with VR headsets, as seen in **Figure 2.18**. Some come in bundles with headsets, and some can be purchased separately and paired with existing ones. There is also a gun and a walk pad for playing an action game, as seen in **Figure 2.18**.

**Figure 2.18** VR controllersSources: [Freepik](#) (Licensed), [Pixabay](#) (Terms)

2.2.2 Augmented Reality (AR)

Augmented Reality (AR) integrates the virtual with the real world ([Herpich et al., 2019](#)). Users will simultaneously see the real environment through the device's camera with overlaid graphics or other digital elements (video, audio, hyperlink, action button, etc.). Pokémon GO (see **Figure 2.19a**), one of the most downloaded mobile apps, is a good example. Similar technology is used in Instagram and Snapchat filters (see **Figure 2.19b**). In education, AR is used in many interactive books where interactive objects will pop up when the page is being scanned using a specific app (see **Figure 2.19c**). Some businesses use AR to create new customer experiences, as illustrated in **Figure 2.19d**. AR business cards, when scanned, can be instantly tapped to email, call, or open a website without having to type in an address or number.



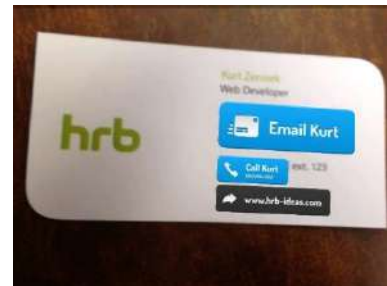
a. Pokémon GO



b. Snapchat filter



c. Interactive book



d. AR business card

Figure 2.19 AR applications

Sources: [Pixabay \(Terms\)](#), Flickr [\(1\)](#) [\(2\)](#) [\(3\)](#) (CC BY, CC BY-SA)

AR also benefits the furniture and interior design industries. One of the examples is the IKEA Place app (see **Figure 1.13**) which allows IKEA customers to pick an item and see if it fits the space before purchasing. Also, there are general-usage apps for measuring 3D objects, as shown in **Figure 2.20**. This technology helps consumers, architectures, and interior designers easily manage their floor plans.



Figure 2.20 AR Ruler app

Source: [Google Play](#) (Fair use)

2.2.3 Mixed Reality (MR)

VR provides an immersive environment where users are cut off from the real environment by the headset, while AR provides a non-immersive display where users view content on a normal screen. Mixed Reality (MR) is a hybrid of VR and AR. The technology creates a smooth transition between these stages ([Ladwig & Geiger, 2018](#)), allowing real and virtual objects to interact in real-time. The idea is comparable to what

we experience when we wear VR headsets and see AR content. Manufacturers simply install additional cameras or sensors into typical VR headsets to capture image data from the environment, process it, and display the result to the user.

Players using MR technology can be identified if we observe them interacting with objects while wearing VR headsets. The computers in **Figure 2.21a** are actual items, and a camera attached to the VR headset records and transmits the user's view of them. Users can physically engage with the virtual plant pot in the image by holding it in their hands. The program is able to recognize the location of the user's hand and determine the desired action. In the example, the user wants to adjust the size of the virtual plant pot by pulling on the object's corner. **Figure 2.21b** shows another example of MR technology in which a user wearing VR headsets can simultaneously see the physical surroundings through a mounted camera and digital images.

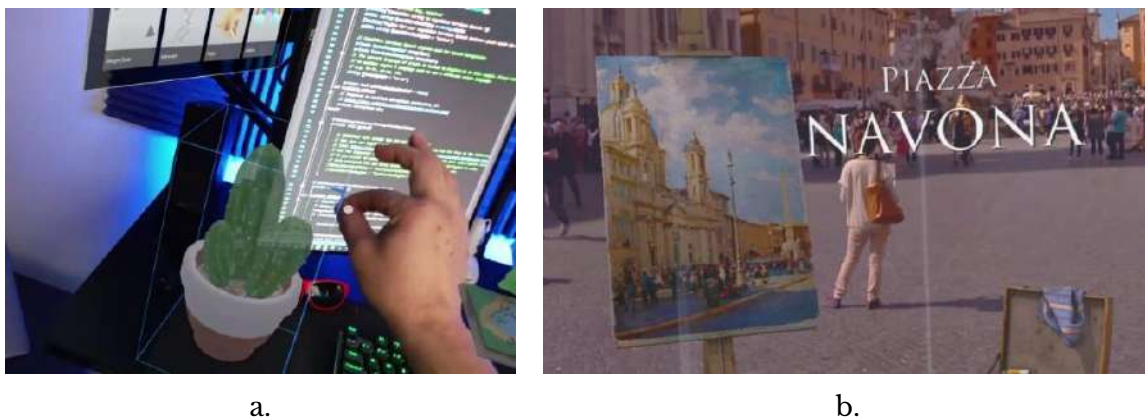


Figure 2.21 Mixed Reality (MR)

Sources: YouTube [\(1\)](#) [\(2\)](#) (CC BY)

MR benefits education, medicine, and manufacturing by allowing operators to first practice or try new things with virtual objects to reduce costs and avoid accidents or injuries. At an advanced level, MR will enable operators to remotely control a mechanical arm or even a surgical robot system.

2.3 Intelligent Technology Applications

We can combine various intelligent technologies to automate existing processes, increase efficiency and convenience, and reduce costs. In this section, we will introduce some possibilities, starting from things close to us, such as homes and habitats, to manufacturing processes and agriculture.

2.3.1 Smart home

Smart home gadgets are available globally, from Wi-Fi-enabled light switches or outlets to thermostats and sensors like smoke and flood detectors (see Figure 2.3). Users simply install and connect the purchased devices to their smartphones to remotely control them and check their status. Users can also program certain devices to turn on and off at a specific time or have them run sequentially with the user commands. **Figure 2.22** shows several smart home devices that use the Google Nest home automation system, including smart thermostats, smart door locks, smart doorbells, smart displays (hub), smart speakers, smart IP cameras, and more. Users can use voice commands to control the devices through the hub, smartphone, or smart speaker.



Figure 2.22 Google Nest system

Source: [Flickr](#) (CC0)

In the near future, these smart devices will become a new standard of living. The high competition has resulted in many new devices being produced and sold. Buying smart home devices starts with choosing products that match the voltage and frequency range we use. Appliances manufactured in the EU and US may not be compatible. Read the product specification carefully to see if it can be used at our location. Next, check the operating system used. Some products are designed for iOS only. Also, if we buy products from multiple manufacturers, they may not work seamlessly together, and we may have to use separate apps for them.

2.3.2 Smart city

For many people to live together in a city, there must be a centralized system that facilitates and maintains security. However, those systems are costly and can pollute the environment. For example, streetlights must be turned on at night to ensure road safety. But leaving the lights on without people passing by would be a waste. The smart street light system, as shown in **Figure 2.23**, will turn on the light at the lowest visible level. Still, the brightness will be automatically adjusted when the motion sensor detects a moving person or vehicle. Similar systems can be found in parking lots in many cities.

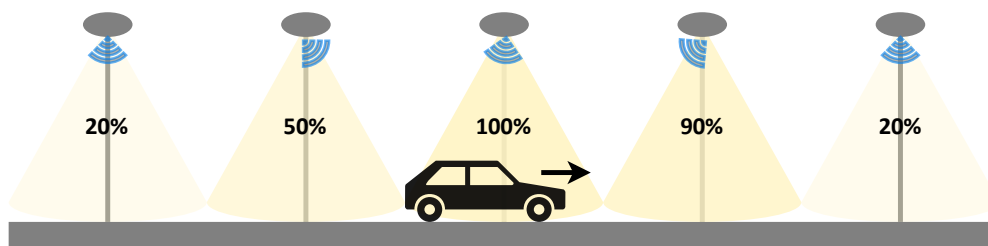


Figure 2.23 Smart street light system

Source: Own work using diagrams.net

As shown in Figure 2.24a, smart surveillance systems can automatically be integrated with traffic control to regulate flows based on real-time conditions. Such systems can detect violations and accidents and notify authorities in an emergency. Some have also linked pollution monitoring systems to traffic management systems. Road users may have to pay additional fees if they attempt to drive on highly polluting routes.

Smart cities can organize a parking reservation system where drivers can reserve parking (or charging stations for electric vehicles) before arrival. The app provides a parking fee payment system and a GPS-based parking spot locator. A bike rental system, as shown in Figure 2.24b, can be implemented for cities that want to reduce pollution. Registered users scan a QR code to unlock the bike and return it to a designated location when finished. The system will calculate the rental fee which will be paid through the app.



a. Traffic surveillance



b. Bicycle-sharing system

Figure 2.24 Smart city subsystems

Source: [Freepik](https://www.freepik.com) (Licensed)

2.3.3 Smart industry

As mentioned earlier in **Section 3.1**, the 4th Industrial Revolution brought a rapid shift in industrial technology due to increased interconnectivity and automation. Part of this transformation is the integration of IoT, AI, and XR that bridge the gap between the physical and digital worlds. Smart industry seamlessly connects purchase orders to design workshops, inventory, production lines, warehouses, and customer support (see **Figure 2.25**). Customers can track their orders as well as trace back if problems exist. Operators can control machines and track inventories through smart systems (e.g., IoT or VR). With real-time updated information on hand, operators can calculate realistic costs.



Figure 2.25 Smart industry concept

Source: [Freepik](#) (Licensed)

The smart industry concept is not limited to the manufacturing industry but also retail, hospitality, agriculture, etc. Amazon Go (see **Figure 2.26**) is a convenience store chain operated by the online retailer Amazon. This store is semi-automated, where registered customers scan the QR code to enter. The store is equipped with multiple cameras that use computer vision and deep learning algorithms to monitor customers and detect which items they pick up. Items will be added to the customer's virtual shopping cart. Similarly, if a customer places an item back on the shelf, it will be removed from the customer's virtual shopping cart. When shopping is done, customers can walk out of the store, and the purchased items will be charged to the credit card associated with their account.



Figure 2.26 Amazon Go

Sources: [Flickr](#) (CC BY-ND), [Wikimedia Commons](#) (CC BY-SA)

Smart farming is a farm management concept that uses smart technologies, particularly the Internet of Things (IoT), to overcome today's challenges in food production, including high demand for food production, reduced workforce, and increase in production costs (Navarro et al., 2020). Farmers can geocode the crop fields to track and direct machines, such as Unmanned Aerial Vehicles (UAVs) and harvesting robots, to operate in a given area. An array of sensors, such as air temperature, soil pH, moisture, humidity, and water volume, feedback data to the control center automatically operates sunshades and irrigation systems. Farm animals are tagged for easy tracking, and farmers will be notified when crops are ready to harvest. The concept of smart farming is illustrated in Figure 2.27.



Figure 2.27 Smart farming concept

Source: [Freepik](#) (Licensed)

Conclusion

Digital transformation is the process by which both public and private entities use digital technology to improve their workflows to be more efficient, automated, and consistent with the real conditions of users. The three pillars of digital transformation include the Internet of Things (IoT), Big data, and Artificial Intelligence (AI). IoT allows users to monitor and control equipment wirelessly from anywhere. And when everything is digitally transformed, the amount of data increases exponentially, most of which is unstructured. Big data requires more efficient storage and processing, such as cloud computing. AI can help us predict data trends, find hidden correlations, and help extract useful information from a massive amount of raw data. AI can improve analytics based on new inputs similar to human learning processes. Machine learning makes AI smarter and more powerful over time.

Extended Reality (XR) consists of Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). VR allows users to interact with a virtual environment created using 3D graphics software (3D VR) or captured using a 360° camera (360° VR). Users can enjoy VR experiences through VR headsets or just using normal screens. AR overlays

digital content on actual images taken with a smartphone camera. MR is based on VR, with additional cameras attached to the headsets to visually input image data from the real environment. The result is an immersive view of the real environment with overlaid virtual objects that users can interact with in real-time.

Smart technologies can work together as a system to streamline and automate the management of homes, cities, and production processes. Consumers can purchase smart devices to install in their homes. Surveillance cameras and sensors can work together to provide security and reduce unnecessary energy consumption. Industry in the new era, whether it is manufacturing, retailing, or providing services, all use smart technology to increase efficiency and meet the real needs of consumers. Smart technologies are not far from us, and they will become the new standard of living and business in the future.

Wrap-up Activity

1) Observe objects around you and think about how to make them "smart." It is not necessary for such an idea to be feasible today. Many inventions were born from the imagination. Only the required technology may not yet exist.

2) Try searching for video clips of people watching VR content and identify the type of VR headsets you see; smartphone, tethered, or standalone.

3) Think about where you've used AR filters, like Instagram or Snapchat. Give it a try if you haven't used it before.

4) Try searching for smart home devices at various online stores, compare prices, and determine if it's worth buying.

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Lesson Plan: Chapter 3

1. Topics

- 1) Digital media
- 2) Infographics
- 3) Issues related to digital media

2. Learning objectives

By the end of this chapter, students should be able to:

- 1) Identify the types of digital media, their properties, and their uses.
- 2) Choose the appropriate method to create digital media.
- 3) List digital media license types and popular royalty-free content sites.
- 4) Use digital media on the internet responsibly.

3. Teaching methods and learning activities

Introduction

1) Show an example of multimedia and have students list some elements they see. Also, ask if they have found such content elsewhere.

2) Ask students about their favorite image/audio/video editing software and if they are free or paid apps.

Presentation

1) Explain four types of digital media, how they are digitized, their subcategories, and their different uses.

2) Explain how infographics help the audience perceives information better than plain text.

3) Demonstrate the use of free infographics templates available online.

4) Describe some issues related to digital media, such as infringement and accessibility, and suggest some online resources for non-copyright media.

Conclusion

1) Give the lesson summary.

2) Students review the lesson from the interactive courseware.

3) Students complete the chapter quiz.

4. Teaching materials

1) Instructional material: GEN0309 Digital Life

2) Presentation (PPTX)

3) Courseware (Moodle SCORM)

5. Assessment and evaluation

- 1) Participation in the class, online meeting, live stream, or meeting record
- 2) Participation in the discussions and demonstrations
- 3) Courseware attempts
- 4) Quiz score

Chapter 3

Digital Media Technology

People have switched from hard copies to digital media as a result of the digital revolution. It has been simpler for people to create, share, and access digital material, which has created numerous economic opportunities. High accessibility to digital media, however, poses issues and difficulties, whether it involves copyright violations or any other misconduct. This chapter will provide an introduction to several forms of digital media, including the creation of easy infographics.

3.1 Digital Media

Digital media is any form of media with machine-readable data, such as Unicode text (.txt), JPEG image (.jpg), Waveform audio (.wav), MPEG video (.mp4), etc. They can be created, viewed, and edited by computers, smartphones, and other smart devices. Digital media exists in various software, documents, entertainment, websites, social media, and online advertising ([Preston, 2022](#)). A single file, such as a PDF or a web page, may consist of multiple media types.

3.1.1 Image

Digital images can be taken or captured by imaging devices, such as digital cameras and scanners, or created using drawing software. Raster and vector graphics, the two main categories of digital images, have different uses described as follows:

Raster graphics

Raster graphics, such as JPEG and PNG, are recognizable by most computers, smartphones, TV screens, and printers. Each picture consists of a square (or rectangle) pixel grid (see **Figure 3.1**). Each pixel contains color combination and other related information. Raster graphics are clearly visible if viewed from a reasonable distance. The image will blur (or be pixelated) when zoomed in too much. Most images we find on websites and social media are raster graphics.

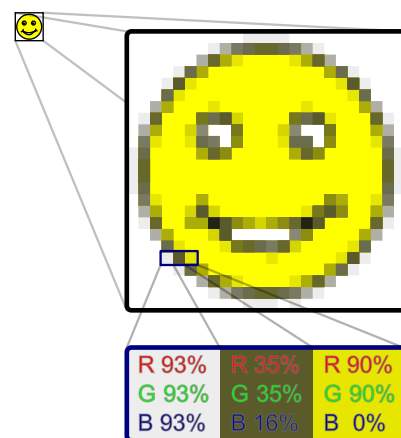


Figure 3.1 Raster graphics
Source: [Wikimedia Commons](#) (CC0)

Raster graphics can be saved in several formats, known as media containers. Different containers (JPEG, GIF, PNG, TIFF) suit different purposes as follows:

1) The Joint Photographic Experts Group (JPEG or JPG) format is commonly used in digital photography. It is a lossy file format, as the image can be compressed as much as needed. High compression reduces the file size but also lowers the quality.

2) Graphics Interchange Format (GIF) can display animations and supports images with transparent backgrounds. GIF is commonly used for logos with solid colors due to its limited color depth. It is not good at displaying gradients.

3) Portable Network Graphics (PNG) format was developed as a replacement for GIF. It supports images with transparent backgrounds but does not support animations. Most logos and die-cut clip arts these days use PNG format.

4) Tag Image File Format (TIFF or TIF) is used among professional photographers and publishers. It is known to have the highest quality but also the largest file size. TIFF is an ideal choice for raw images that need to be processed several times.

In addition to the four primary categories, there are also alternative formats. Google has created a brand-new format called WebP. It may not support further editing, but it is appropriate for displaying thumbnails because they are small and load fast on web browsers. Other popular formats like Windows Bitmap (BMP) aren't often utilized.

A wide range of photo editing software may be used to edit raster graphics. Adobe Photoshop is one of the most popular photo editors for desktop computers. Snapseed is one of the favorite mobile apps for enhancing digital photos. Web applications, such as [Photopea](#) (see **Figure 3.2**), can be used on a web browser without the need to install any additional program.

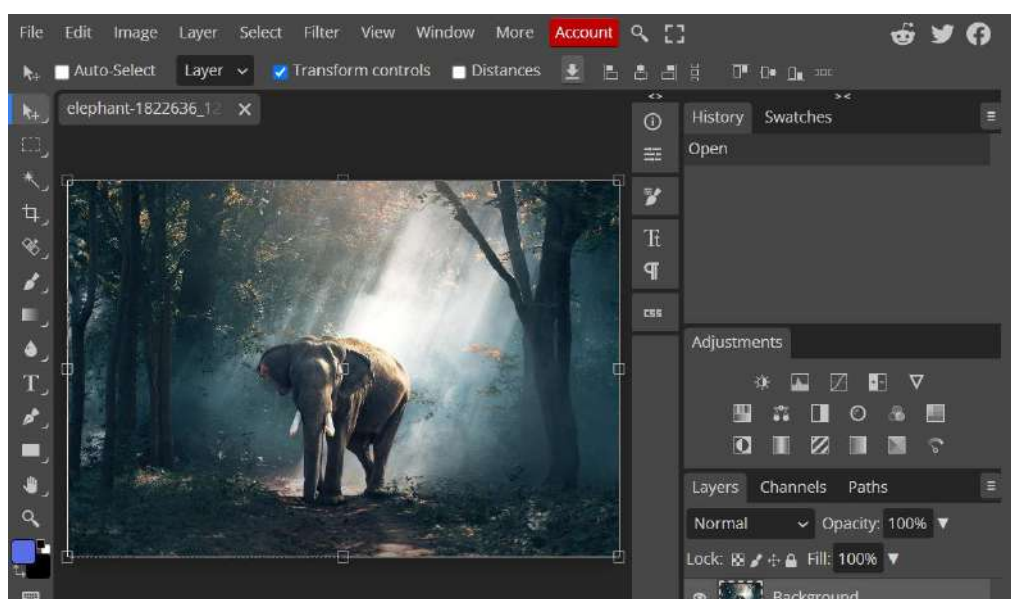


Figure 3.2 Web application for photo editing

Source: Own screenshot showing [Photopea](#), containing a photo from [Pixabay](#) ([Terms](#))

Vector graphics

Vector graphics consist of geometric shapes, such as lines, arcs, polygons, and curves. Upon resizing or scaling, graphic software will relocate key points (e.g., endpoints of a polygon) and recalculate pixels along the path (see **Figure 3.3**). These properties allow vector graphics to be infinitely scalable without pixelation or loss of quality.

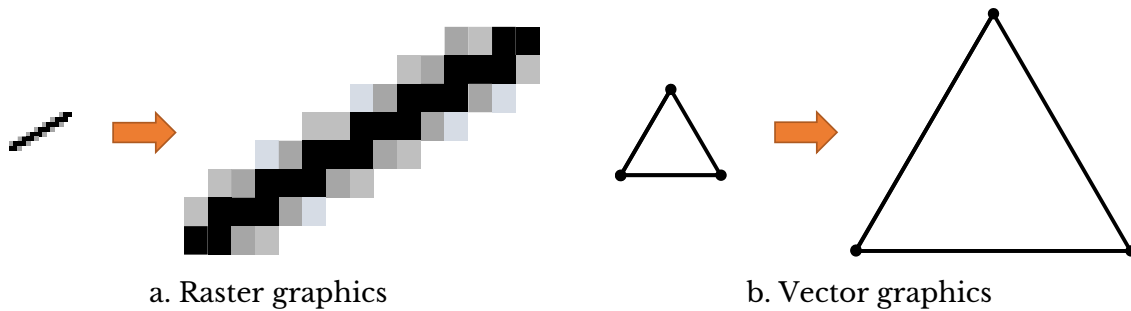


Figure 3.3 Scaling raster and vector graphics

Source: Own work using PowerPoint

Vector graphics can be found in logos, clip art, and diagrams. Look for certain file types, such as SVG (Scalable Vector Graphics) or EPS (Encapsulated Postscript). Font faces are often designed in vector format so that text can be scaled to any size. Raster and vector graphics are clearly distinguishable, as shown in **Figure 3.4**. Please note that vector graphics that are published on websites are usually rasterized to enhanced compatibility, so they appear as PNG images.



Figure 3.4 Raster and vector graphics examples

Source: [Pixabay \(Terms\)](#)

Vector graphics are typically created using graphic design software, such as Adobe Illustrator or Inkscape. Some general programs, such as PowerPoint, can also produce vector graphics. Many artworks in this teaching material were created using [diagrams.net](#), a web application, and saved as vector graphics. We are normally unable to vectorize full-resolution images taken with a camera unless they contain only geometric shapes and text.

3.1.2 Audio

By definition, sound or audio is an analog signal. The waveform must be sampled at intervals in order to maintain it in a digital format (see **Figure 3.5**). This results in the digitized audio being less smooth than the original analog, depending on the sampling frequency, also known as the sample rate. But it's anticipated that, at some point, regular human ears won't be able to distinguish high- and low-resolution audio.

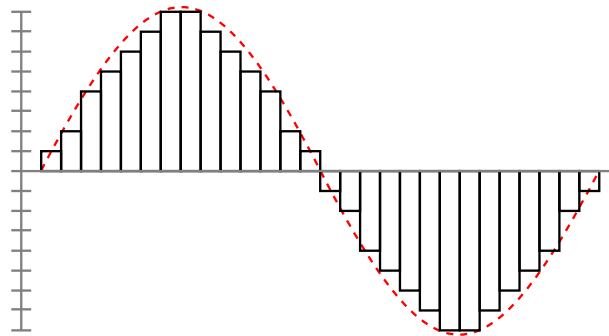


Figure 3.5 Digital audio sampling

Source: Own work using diagrams.net

Audio files can be saved in an uncompressed audio format (e.g., WAV) or a lossless format (e.g., M4A) for further editing. Or, they can be compressed and saved in a lossy format (e.g., MP3 and AAC) for publishing. To compress and decompress digital audio, the encoder and player must have the matching audio codec. Most computers, smartphones, and smart TVs have built-in audio players. Many people also use universal video and audio players, such as VLC and GOM, to play audio files. Audio editing requires specialized software, such as Audacity (see **Figure 3.6**) or GarageBand.



Figure 3.6 Audio editing software

Source: Own screenshot showing [Audacity](https://www.audacityteam.org/)

3.1.3 Video

Whether digital or analog, each video has audio and video tracks that play simultaneously (see **Figure 3.7**). A video track is actually a collection of still images (see **Figure 3.8**) that are constantly captured or played at a constant speed. The number of frames appearing within a second is called the frame rate, expressed in frames per second (FPS). The term applies to both analog and digital videos. The film industry standardized the 24 FPS frame rate because it was ideal for tricking viewers into thinking they were viewing a single continuous recording rather than a sequence of still images ([Kurniawan & Hara, 2022](#)).

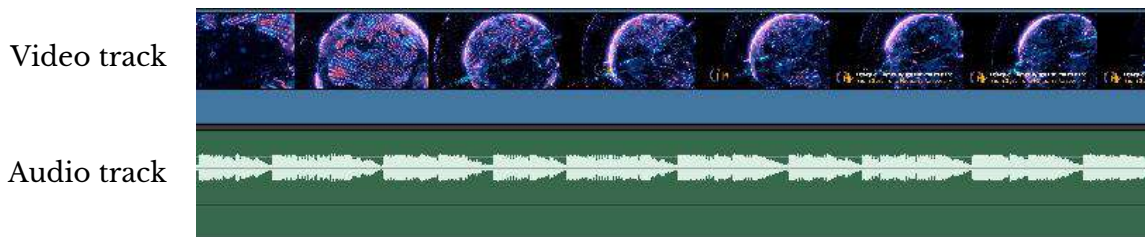


Figure 3.7 Video and audio tracks

Sources: Own screenshot showing [Davinci Resolve](#), contains a video snapshot from [Pixabay \(Terms\)](#)

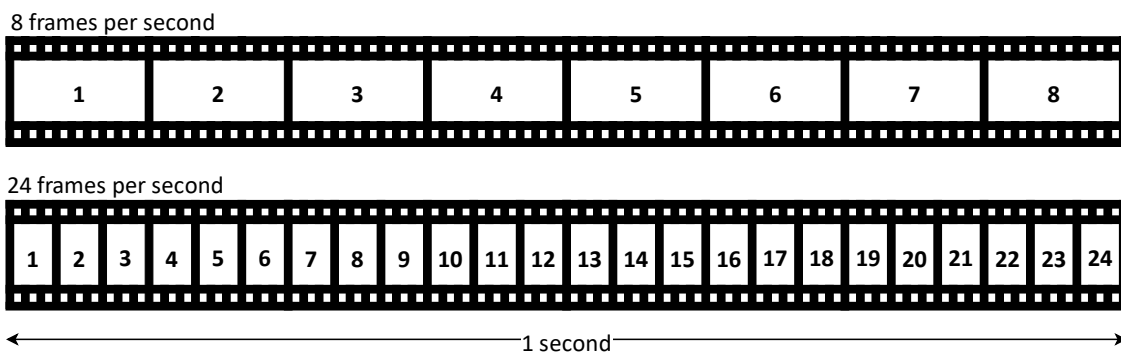


Figure 3.8 Video frames

Source: Own work using [diagrams.net](#)

Most TV shows and live events, especially sports, record at 30 FPS, as critical moments might happen in just a turn of a second. A 4K video record up to 60 FPS can capture even a small detail. The 60 FPS is also great for recording action video games. Frame rates of 120 FPS and above are used for capturing slow-motion videos. Recording at these high frame rates requires high-speed cameras, which are expensive and only available in certain industries.

Video files can be saved in various formats depending on the desired output quality, file size, and viewing platform. Some major formats recognized by computers and smartphones are as follows:

- AVI provides the highest quality but has a large file size. It works with almost every platform, whether a web browser, a TV, or a video player.

- MP4 is the most common video file format. It can be played on most devices. This format has a reasonable quality and file size. MP4 is favorable for posting on social media like YouTube, Facebook, or Instagram.

- MOV was developed by Apple to be used for QuickTime Player, but it is also supported by other platforms such as Facebook and YouTube.

There are other known video file formats developed by individual manufacturers, such as WMV (Microsoft), AVCHD (Sony), FLV (Adobe), and WebM (Google), which serve the same purposes as its image file counterpart WebP explained earlier. Similar to audio, compressing and decompressing digital video requires the encoder and player to have matching video and audio codecs.

Digital videos can be played using the platform's built-in media players or any third-party universal media players. To free up device storage, video files are frequently uploaded to the cloud and streamed online. Video editing requires specialized software, such as Adobe Premiere, iMovie, Final Cut Pro, and Davinci Resolve (see **Figure 3.9**). The video editor allows users to layer multiple video and audio tracks, as well as overlay still images and text. A rendering process will generate the final video output consisting of one video track and one audio track.

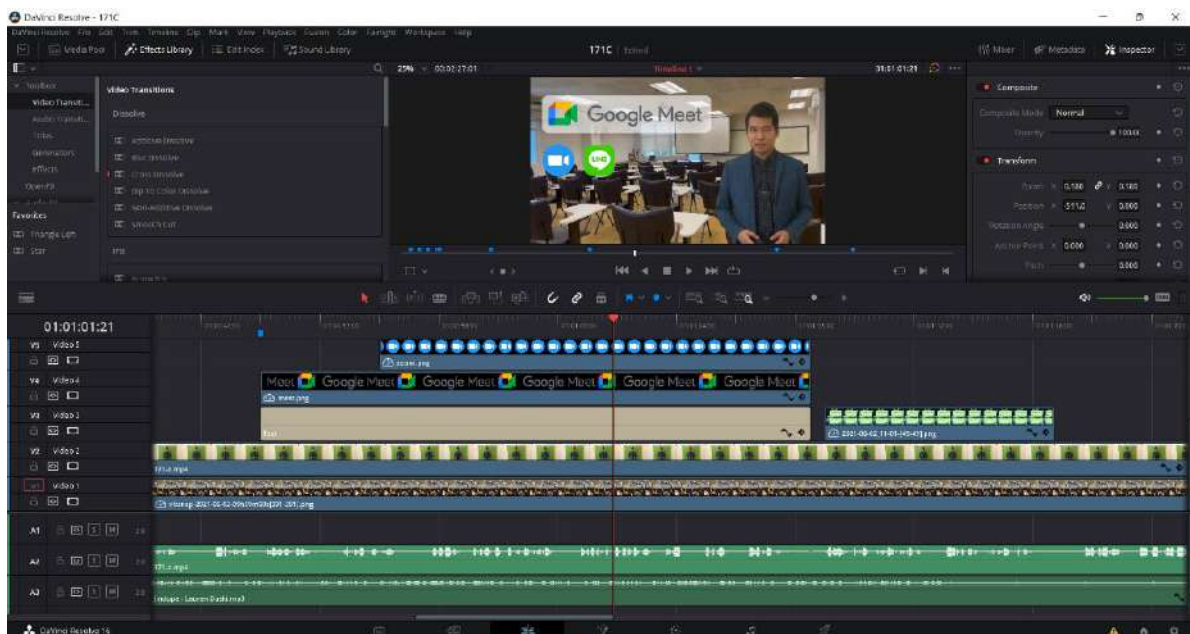


Figure 3.9 Video editing software

Source: Own screenshot showing [Davinci Resolve](#), contains trademarks

3.1.4 Text

Text files store text messages in electronic format. Plain text (TXT) contains characters from a specific character set. The ASCII, as shown in Figure 3.10, contains English letters, symbols, and control characters (e.g., space, tab, and new line). Characters in other languages use the UTF formats. Plain text has high compatibility across platforms, only that the reader must adjust the character set to match the original one (or the text will be corrupted and unreadable).

The ASCII code
American Standard Code for Information Interchange

ASCII control characters		ASCII printable characters						Extended ASCII characters																
DEC	HEX	Simbolo	ASCII	DEC	HEX	Simbolo	ASCII	DEC	HEX	Simbolo	ASCII	DEC	HEX	Simbolo	ASCII	DEC	HEX	Simbolo	ASCII					
00	00h	NUL	(carácter nulo)	32	20h	espacio	64	40h	@	96	60h	-	128	80h	Ç	160	90h	à	192	C0h	À	224	E0h	Ó
01	01h	SOH	(inicio encabezado)	33	21h	!	65	41h	Á	97	61h	a	129	81h	Ù	161	91h	í	193	C1h	Á	225	E1h	Ô
02	02h	STX	(inicio texto)	34	22h	"	66	42h	B	98	62h	b	130	82h	â	162	92h	î	194	C2h	Â	226	E2h	Ö
03	03h	ETX	(fin de texto)	35	23h	#	67	43h	C	99	63h	c	131	83h	ã	163	93h	ï	195	C3h	Ã	227	E3h	Ø
04	04h	EOT	(fin transmision)	36	24h	\$	68	44h	D	100	64h	d	132	84h	ä	164	94h	ï	196	C4h	Ä	228	E4h	Ù
05	05h	ENQ	(temporal)	37	25h	%	69	45h	E	101	65h	e	133	85h	å	165	95h	ï	197	C5h	Å	229	E5h	Ò
06	06h	ACK	(acknowledgement)	38	26h	&	70	46h	F	102	66h	f	134	86h	ä	166	96h	ï	198	C6h	Ä	230	E6h	Û
07	07h	BEL	(buzzer)	39	27h	'	71	47h	G	103	67h	g	135	87h	ç	167	97h	*	199	C7h	Ç	231	E7h	Ü
08	08h	BS	(retroceso)	40	28h	(	72	48h	H	104	68h	h	136	88h	è	168	98h	ç	200	C8h	È	232	E8h	Ý
09	09h	HT	(tab horizontal)	41	29h	)	73	49h	I	105	69h	i	137	89h	é	169	99h	ç	201	C9h	É	233	E9h	Û
10	0Ah	LF	(salto de linea)	42	2Ah	!	74	4Ah	J	106	6Ah	j	138	8Ah	ê	170	A0h	ç	202	CAh	Ê	234	EAh	Ü
11	0Bh	VT	(tab vertical)	43	2Bh	+	75	4Bh	K	107	6Bh	k	139	8Bh	ë	171	ABh	ç	203	CBh	Ë	235	EBh	Ý
12	0Ch	FF	(form feed)	44	2Ch	,	76	4Ch	L	108	6Ch	l	140	8Ch	ì	172	ABh	¼	204	CBh	Ì	236	EBh	ÿ
13	0Dh	CR	(retorno de carro)	45	2Dh	-	77	4Dh	M	109	6Dh	m	141	8Dh	í	173	ABh	½	205	CBh	Í	237	EBh	ÿ
14	0Eh	SO	(shift Out)	46	2Eh	.	78	4Eh	N	110	6Eh	n	142	8Eh	î	174	ABh	¾	206	CBh	Î	238	EBh	ÿ
15	0Fh	SI	(shift in)	47	2Fh	/	79	4Fh	O	111	6Fh	o	143	8Fh	ÿ	175	ABh	¸	207	CBh	Ï	239	EBh	ÿ
16	10h	DLE	(data link escape)	48	30h	0	80	50h	P	112	70h	p	144	90h	ÿ	176	ABh	¸	208	CBh	ÿ	240	EBh	ÿ
17	11h	DC1	(device control 1)	49	31h	1	81	51h	Q	113	71h	q	145	91h	ÿ	177	ABh	¸	209	CBh	ÿ	241	EBh	ÿ
18	12h	DC2	(device control 2)	50	32h	2	82	52h	R	114	72h	r	146	92h	ÿ	178	ABh	¸	210	CBh	ÿ	242	EBh	ÿ
19	13h	DC3	(device control 3)	51	33h	3	83	53h	S	115	73h	s	147	93h	ÿ	179	ABh	¸	211	CBh	ÿ	243	EBh	ÿ
20	14h	DC4	(device control 4)	52	34h	4	84	54h	T	116	74h	t	148	94h	ÿ	180	ABh	¸	212	CBh	ÿ	244	EBh	ÿ
21	15h	NAK	(negative acknowledge)	53	35h	5	85	55h	U	117	75h	u	149	95h	ÿ	181	ABh	¸	213	CBh	ÿ	245	EBh	ÿ
22	16h	SYN	(synchronous idle)	54	36h	6	86	56h	V	118	76h	v	150	96h	ÿ	182	ABh	¸	214	CBh	ÿ	246	EBh	ÿ
23	17h	ETB	(end of trans. block)	55	37h	7	87	57h	W	119	77h	w	151	97h	ÿ	183	ABh	¸	215	CBh	ÿ	247	EBh	ÿ
24	18h	CAN	(cancel)	56	38h	8	88	58h	X	120	78h	x	152	98h	ÿ	184	ABh	¸	216	CBh	ÿ	248	EBh	ÿ
25	19h	EM	(end of medium)	57	39h	9	89	59h	Y	121	79h	y	153	99h	ÿ	185	ABh	¸	217	CBh	ÿ	249	EBh	ÿ
26	1Ah	SUB	(substitute)	58	3Ah	:	90	5Ah	Z	122	7Ah	z	154	9Ah	ÿ	186	ABh	¸	218	CBh	ÿ	250	EBh	ÿ
27	1Bh	ESC	(escape)	59	3Bh	;	91	5Bh	[	123	7Bh	[	155	9Bh	ÿ	187	ABh	¸	219	CBh	ÿ	251	EBh	ÿ
28	1Ch	FS	(file separator)	60	3Ch	<	92	5Ch	\	124	7Ch	\	156	9Ch	ÿ	188	ABh	¸	220	CBh	ÿ	252	EBh	ÿ
29	1Dh	GS	(group separator)	61	3Dh	=	93	5Dh	]	125	7Dh	]	157	9Dh	ÿ	189	ABh	¸	221	CBh	ÿ	253	EBh	ÿ
30	1Eh	RS	(record separator)	62	3Eh	>	94	5Eh	^	126	7Eh	^	158	9Eh	ÿ	190	ABh	¸	222	CBh	ÿ	254	EBh	ÿ
31	1Fh	US	(unit separator)	63	3Fh	?	95	5Fh	_				159	9Fh	ÿ	191	ABh	¸	223	CBh	ÿ	255	EBh	ÿ
127	7Fh	DEL	(delete)																					

Figure 3.10 ASCII character set

Source: [Wikimedia Commons](https://commons.wikimedia.org/wiki/File:ASCII-table.svg) (CC BY-SA)

Formatted text (also known as rich text), such as RTF and DOC, contains information regarding font and text alignment. Formatted text can be corrupted if the target device doesn't have an associated font or uses a different alignment system (see Figure 3.11). If the document is to be published with no further editing, it is suggested to convert the file into PDF to maximize compatibility. Many websites keep plain text in the database, so it can be formatted at the destination without causing a compatibility issue.

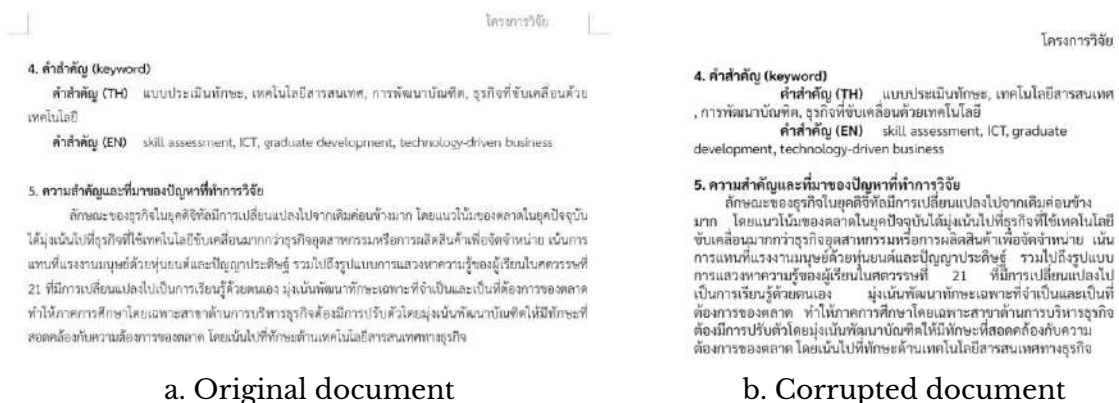


Figure 3.11 Corrupted document due to missing fonts

Source: Own screenshots showing Microsoft Word

3.2 Infographics

Infographics (a combination of "information" and "graphics") are the use of images as part of the presentation of information so that the audience can understand it quickly and clearly ([Smiciklas, 2012](#)). The idea comes from a popular phrase that says, "One picture is worth a thousand words." It is academically accepted that humans are better at recognizing visual images than reading text alone ([Mayer, 1997](#)).

Indeed, infographics are not a new idea. Humans have been known to communicate using visual graphics since prehistoric times, long before the invention of languages and text communication. **Figure 3.12a** display the Lascaux cave painting aged around 15,000-17,000 years. **Figure 3.12b** shows an early form of written language combined with visual graphic presentation aged around 5,000 years.



a. Lascaux cave painting



b. Egyptian hieroglyphs

Figure 3.12 Visual communication in ancient times

Sources: Wikimedia Commons ([1](#)) ([2](#)) (CC BY, CC BY-SA)

Modern infographics are typically created using computer graphics software or web/mobile applications. Nevertheless, the concept remains the same: to make the audience retrieve information quickly and accurately.

3.2.1 Purposes of use

Infographics do not diminish the importance of books and literature. But when there is a specific need, infographics can be the right choice. We often use infographics for the following purposes:

To announce something important

There are some important events that people need to know quickly and accurately, such as an earthquake or tsunami alert. The infographic in **Figure 3.13** gives people an approximate time when a tsunami will hit each area, so people along the coast can prepare to evacuate if necessary.



Figure 3.13 Tsunami alert infographics

Source: [abc NEWS](#) (Fair use)

To demonstrate how-to

Text descriptions are not very effective in demonstrations. Figure 3.14a shows how to wash your hands in 12 steps. Infographics can explain how to use or assemble equipment effectively. For something very important, infographics can help reduce the language barrier. Figure 3.14b shows how to wear a face mask properly without using any words.



a. How to wash your hands

b. How to wear a face mask properly

Figure 3.14 How-to infographics

Source: [Freepik](#) (Licensed)

To show how things work

Explaining how things work for non-professionals can be challenging. The diagram in Figure 3.15 shows how a car air conditioner system works. People can understand it without any prior engineering knowledge. Sometimes opening it up to see what's inside can be as inconvenient as using an explanatory diagram.



Figure 3.15 How-things-work infographics

Source: [Freepik](#) (Licensed)

To tell a story

This kind of infographic demonstrates how something has changed through time as well as potential patterns. Or it might describe the whole thing, from the very beginning to the final product. The Industrial Revolution, shown in Figure 1.12, is an example. Figure 3.16 is another example of a past salmonella outbreak, showing how pathogens travel from farm to table and how they can be prevented. This type of infographic is also used to tell historical stories about people, places, or organizations. Infographics make it easier for viewers to follow and put together the story than just reading an article.

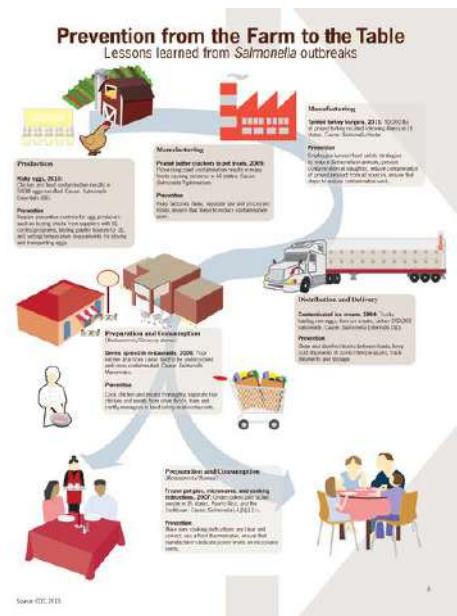


Figure 3.16 Story infographics

Source: [CDC](#) (CC0)

To present numerical data

Using charts and graphs to illustrate numerical data is a common practice. Visual representation of data allows viewers to perceive information quickly. Spreadsheet programs like Excel can easily create charts and graphs with just a few clicks. We only have to choose the correct data series and the chart type to match the presented data (see Figure 3.17).

- Pie charts are good for showing the proportions and percentages of a few sets of data. The audience will focus first on the pieces with the greatest proportions.

- Bar or column charts are great for comparing raw data, such as prices or headcounts. Viewers can clearly see how big each data set is compared to the others.

- Line graphs are used to show the trend of data changing over time or to show the relationship between two sets of data.

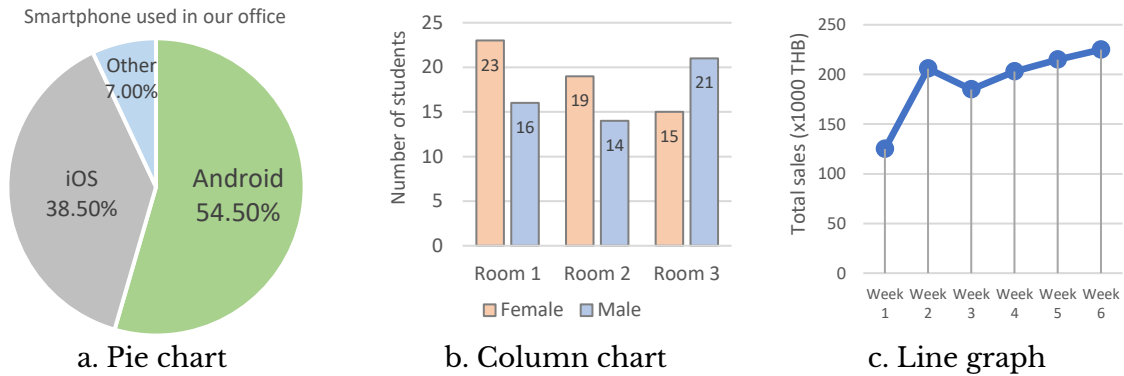


Figure 3.17 Charts and graphs

Source: Own work using Excel

To encourage behavior change

Text messages have a hard time expressing emotion. It can be time-consuming and ineffective to try and alter someone's behavior based just on what they read. Through images, infographics can swiftly trigger human emotions. Figure 3.18 depicts the campaign encouraging people to stop smoking by displaying various stages of lung cancer when smoking.

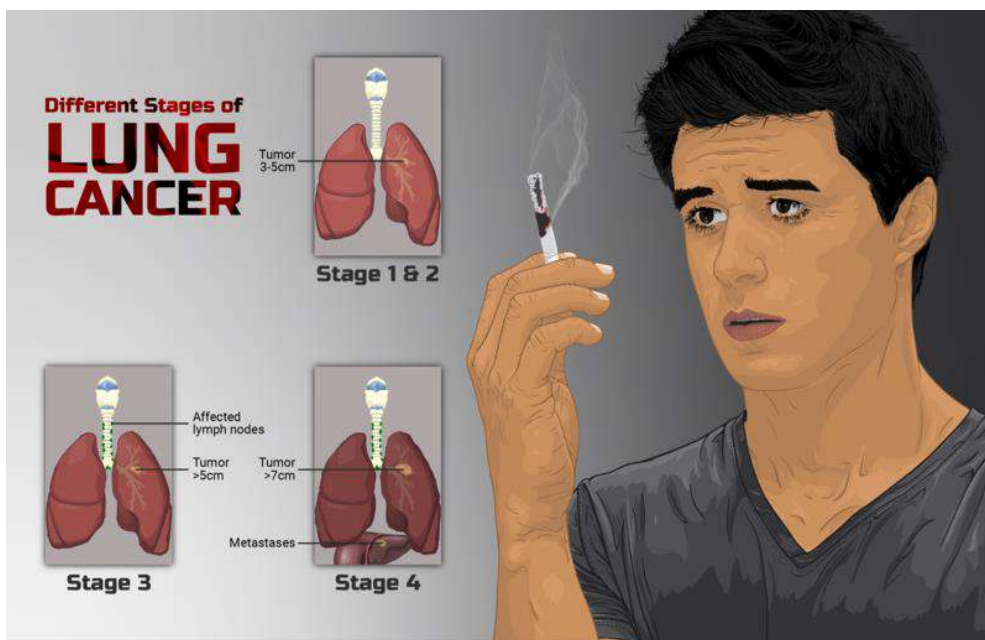


Figure 3.18 Promoting smoking cessation through infographics

Source: [Wikimedia Commons](https://commons.wikimedia.org/wiki/File:Stages_of_Lung_Cancer.jpg) (CC BY-SA)

To promote products or services

Businesses use distinctive features of infographics to attract potential customers. As seen in **Figure 3.19**, an online advertisement that makes use of appealing text and colors is particularly effective at encouraging purchases.



Figure 3.19 Infographics for online advertisement

Source: Template from [Canva Education \(Terms\)](#)

3.2.2 Software, templates, and layouts

Advanced users may use a vector graphics editor, such as Adobe Illustrator, to design infographics. This can take a lot of time and effort to master the drawing. Fortunately, many online apps make it simple for beginners to create infographics from pre-defined layouts and templates. Canva, as shown in **Figure 3.20**, offers a variety of infographic templates for banner ads, posters, brochures, presentations, etc. This app was used to create many infographic works in this teaching material. Other online services include [Piktochart](#), [Venngage](#), [Infogram](#), and [Visme](#). Or, if you're more into PowerPoint, you can also download many templates on the internet.

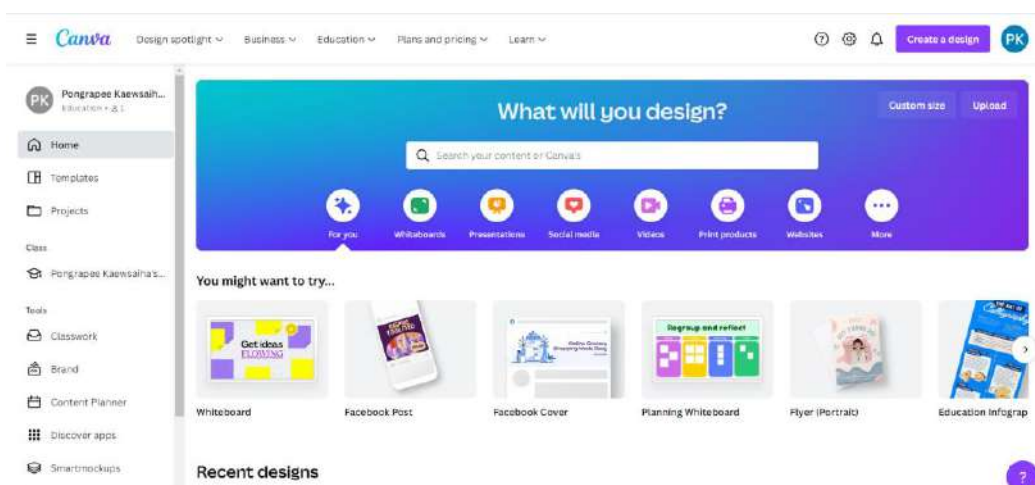


Figure 3.20 Online app that offers infographics templates

Source: Own screenshot showing [Canva Education](#)

Although there are many templates to choose from, infographics can be categorized by how content is presented as follows:

List

List infographics are widely used in presentations. The presenter summarizes what needs to be presented and display it as a numbered sequence, bullet points, or separate blocks, each of which is equally important (see **Figure 3.21**).

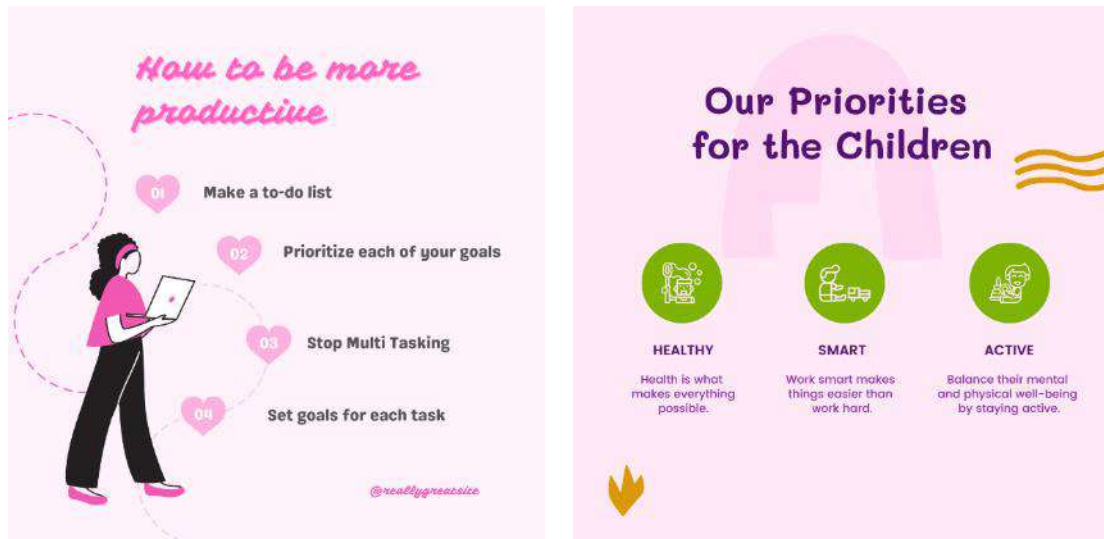


Figure 3.21 Listed infographics

Source: Templates from [Canva Education \(Terms\)](#)

Hierarchy and organization chart

Hierarchy infographics place the most important items at the top and lower the level according to their importance (see **Figure 3.22**). This type of infographic is often represented as a pyramid or organization chart.

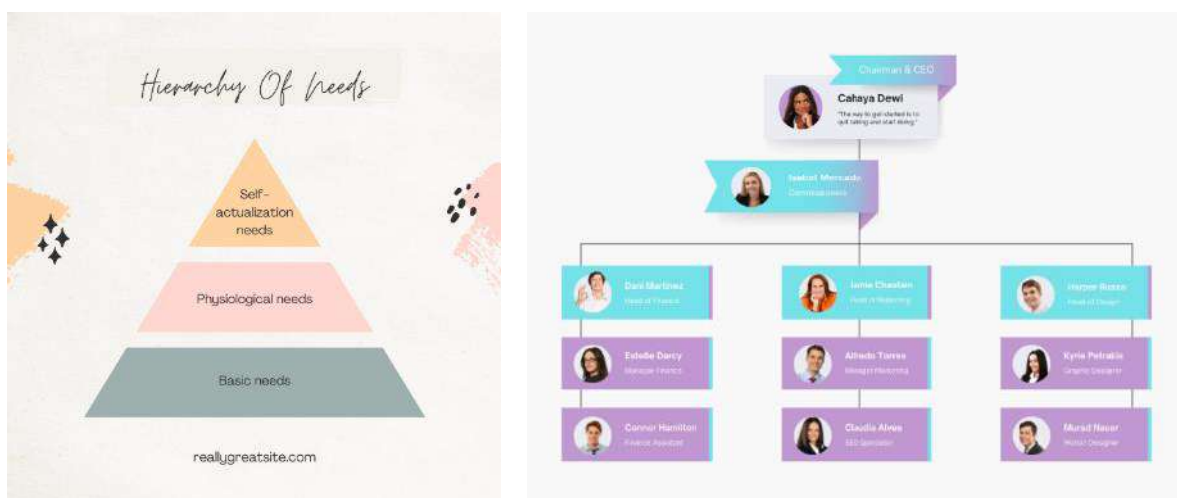


Figure 3.22 Hierarchy infographics

Source: Templates from [Canva Education \(Terms\)](#)

Timeline/Roadmap

Timeline or roadmap infographics display items chronologically (see **Figure 3.23**). These templates illustrate historical events or tell a procedure. What happened first or needs to be done first appears on the top, far left, or at the beginning of the road.

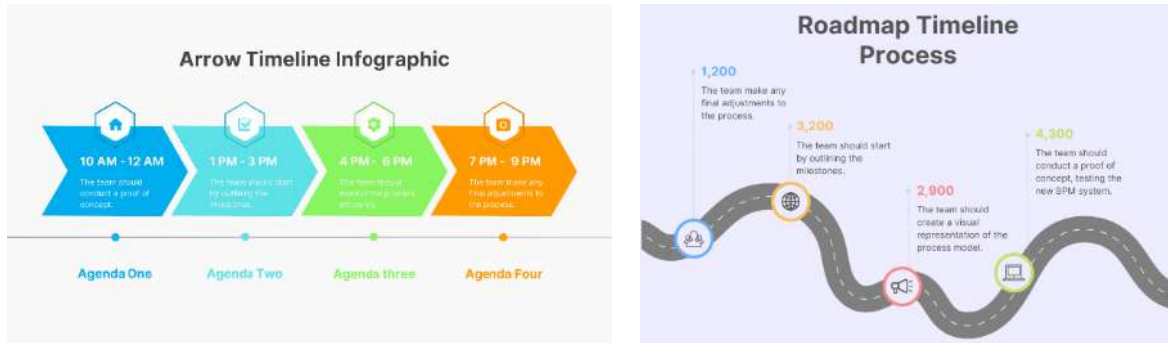


Figure 3.23 Timeline infographics

Source: Templates from [Canva Education \(Terms\)](#)

Comparison/Versus

Comparison infographics help viewers clearly see the difference between two or more options (see **Figure 3.24**). These templates are often used to compare the features of different products, such as smartphones or computers. They are also used to compare the pros and cons and the dos and don'ts.

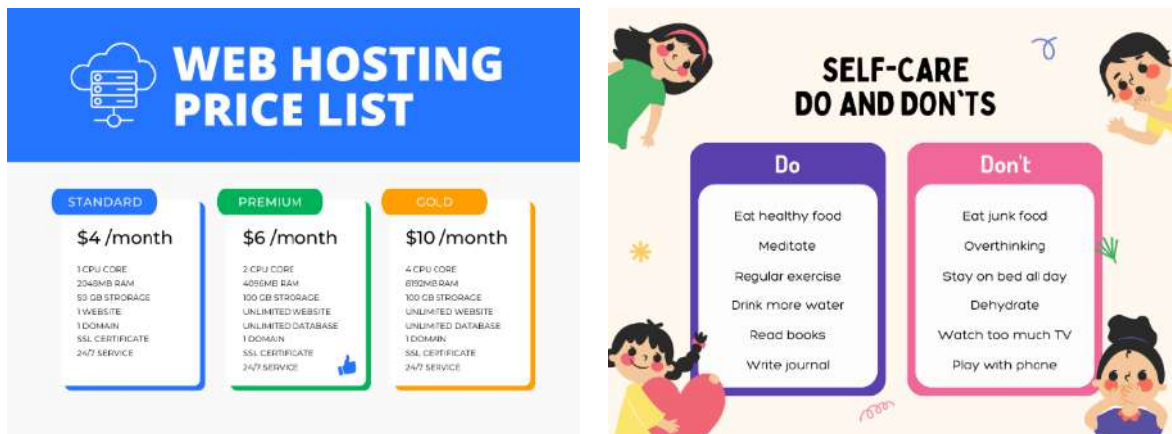


Figure 3.24 Comparison infographics

Source: Templates from [Canva Education \(Terms\)](#)

Flowchart and diagram

A flowchart consists of steps, actions, and decisions. It is useful in coding and system designs. A diagram shows a process workflow that supports decision-making and troubleshooting. In addition to using templates, we can also draw flowcharts and diagrams using special software or application (see **Figure 3.25**). The program allows shapes to be connected and snapped to key points, making drawing easier.

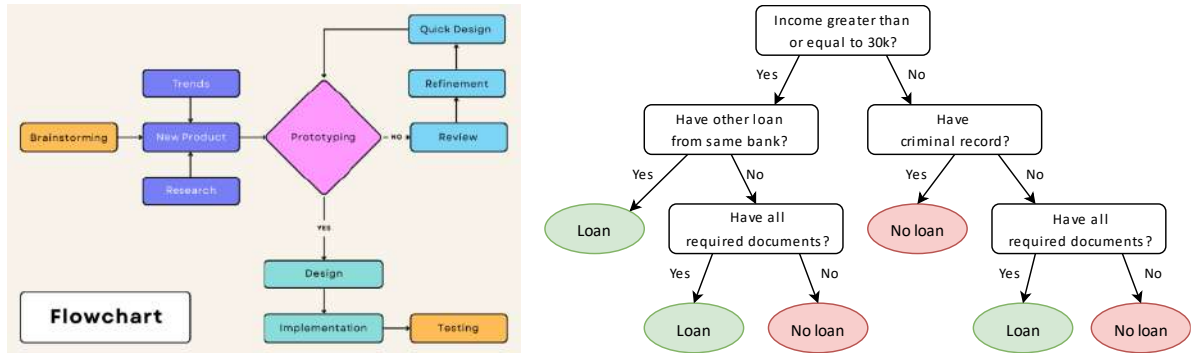


Figure 3.25 Flowchart and diagram

Sources: Own work using diagrams.net, contain a template from [Canva Education \(Terms\)](https://www.canva.com/education/terms/),

Internal structure

Structure infographics show components, such as computer parts, internal organs, and floor plans. Some structural diagram shows a cross-section of a device or plant, as shown in Figure 3.26. We hardly see such a template because each structure diagram is designed to fit a specific object.

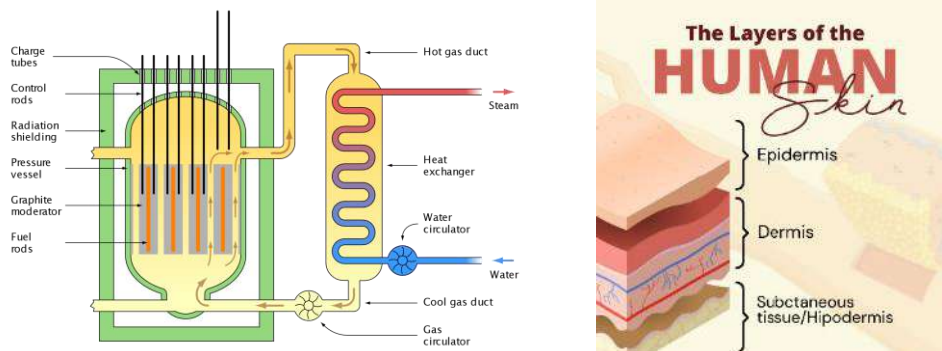


Figure 3.26 Structure infographics

Sources: [Wikimedia Commons](https://commons.wikimedia.org/) (CC BY-SA), template from [Canva Education \(Terms\)](https://www.canva.com/education/terms/)

Numerical charts, graphs, and pictograms

Graphs and charts are normally created using a spreadsheet program (e.g., Excel and Google Sheets) based on numerical inputs (see Figure 3.17). Infographic templates can't produce accurate graphs but can show a rough visualization of pictograms, as shown in Figure 3.27.

Each type of presentation may not equally attract the audience so that designs may use a combination of numbers, charts, and pictograms.

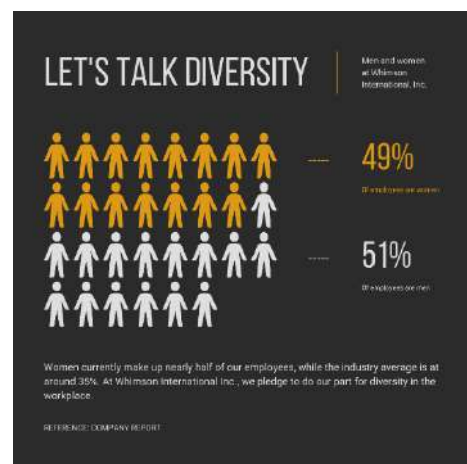


Figure 3.27 Pictogram

Source: Template from [Canva Education](https://www.canva.com/education/terms/)

3.2.3 Infographics design principles

If you have information that you want to present as infographics, the following steps will help you ensure an effective presentation.

Make a short brief

Specify the topic to be presented and the target audience. In many cases, infographics for adults may not be suitable for children. In addition, the elderly may not be able to read small text. Also, clearly define the objectives (e.g., to solicit customer attention, provide information, or encourage behavioral change) as described in **Section 3.2.1**.

Get useful and accurate information

Infographics should present information that is current and interesting. We should offer what people want to know, things that are rarely publicly disclosed, or something that will save people time searching. Since infographics can be easily shared online, designers are responsible for showing accurate information.

Make a conclusive detail

Infographics should be short and take little time to remember and understand. Therefore, we need to summarize the information, present only the highlights, and discard all useless lengthy details.

Group similar ideas

In order for the audience to easily perceive the information, the same type of information should be grouped. Viewers should clearly see which information is on the same level or what is compared.

Choose the appropriate format

Grouping data will help creators choose the appropriate template. For example, if two sets of data are found to be similar and different in some respects, the authors may choose to use a comparison template. A graph presentation might be a viable choice if the data is in a numerical tabular manner.

Start designing

By now, everyone should recognize some tools for creating infographics. Choose the app you like or the one you have access to and start designing.

Test the design on different devices

The design will look different when viewed on a desktop, smartphone, or tablet (see **Figure 3.28a**). A design that looks perfect when viewed on a large screen can look terrible on a smaller screen. Printing and on-screen graphics have different design approaches due to their distinct color systems (see **Figure 3.28b**).



a. Design on different devices

b. On-screen (Left) and in print (Right)

Figure 3.28 Designs displayed on different devices

Source: [Freepik](#) (Licensed)

3.3 Issues Related to Digital Media

Digital media are easy to create, find, and distribute. Many times, conveniences cause problems consciously and unconsciously. There are lots of images and information on the internet, but that doesn't mean we have a right to use or redistribute them. Sometimes we create quality media that may not be accessible to certain groups, such as the visually impaired. We will cover these points in this section.

3.3.1 Infringement

According to the law, the copyright of digital media is owned by the person who created the work. Protection begins as soon as the media is saved to a hard drive, cloud storage, paper, or other storage media ([U.S. Copyright Office, 2022](#)). Entries do not need to be registered to be covered by copyright protection. The duration of copyright protection may vary from country to country. Any use or redistribution of copyrighted material requires permission from the content creator or the legitimate copyright holder.

Usage rights search tool

Google Images is the place we can find images from large online photo libraries. Unfortunately, the majority of searchable photos are copyrighted. Nevertheless, we may configure the search engine to only display photos that aren't protected by copyright (see **Figure 1.6**). YouTube has this function, too. Remember that we still need to comply with the terms of use, even with non-copyrighted media.

Creative Commons (CC)

Digital content created under a Creative Commons license is allowed to be used by others under certain conditions without notice to the creator (Creative Commons, n.d.). This type of material will be tagged and displayed with the following permission messages or symbols:

- Public domain (CC0) -- Such content is the public domain. Anyone can use it without any conditions.
- Attribution required (BY) -- Such content is allowed to be used with attribution and acknowledgment of ownership.
- Share-alike (SA) -- Such content is allowed to be used. But if any modifications are made, the modified work must carry the same license.
- No derivative (ND) -- Such content is allowed to be used but not modified. It must be shared or published as it was.
- Non-commercial (NC) -- Such content is allowed to be used but may not be for commercial or monetizing purposes.

Creative Commons licenses are typically declared in bundles, as shown in **Figure 3.29**. Note that **Figure 3.29** itself was published under the Creative Commons license.



Figure 3.29 Creative Commons licenses

Source: [Wikimedia Commons](#) (CC BY-SA)

The licenses also apply to music, video, literature, and other creative works. Some YouTube videos are published under a Creative Commons license, as shown in **Figure 3.30a**, which other content creators can reuse with attribution (CC BY). YouTube also has an [audio library](#) that offers Creative Commons music and sound effects (see **Figure 3.30b**).

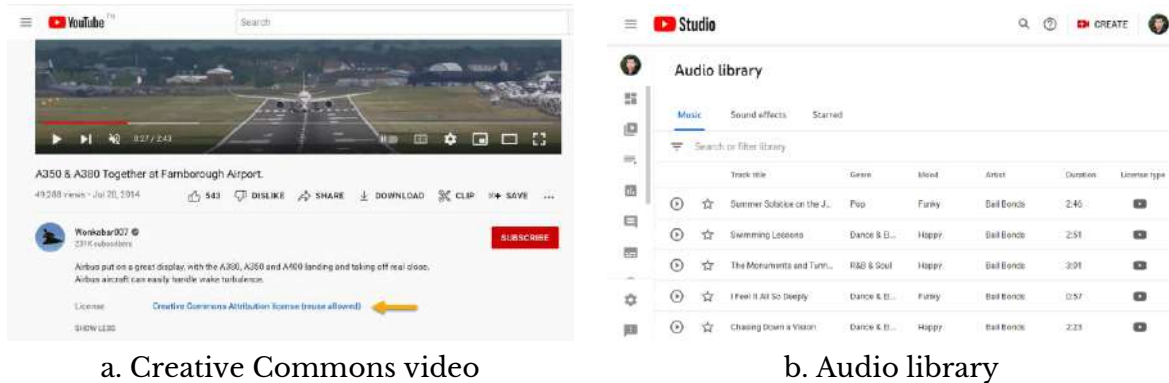


Figure 3.30 YouTube Creative Commons

Source: Own screenshot showing [YouTube video](#) (CC BY) and [audio library](#)

Royalty-free

Royalty-free content remains subject to copyright or other intellectual property rights but may be used without paying royalties or license fees. Finding usable digital media is much easier if you know some websites that publish royalty-free digital media.

[Pixabay](#) (see **Figure 3.31**) offers royalty-free stock photos, illustrations, vector graphics, videos, music, sound effects, and GIF animations. As of September 2022, the [License Agreement](#) allows all content to be used without attribution, even for commercial purposes. Other websites that offer similar services include [Pexels](#), [Unsplash](#), [Canva](#), and [Freepik](#). Free fonts for commercial use can be downloaded from trusted websites like [Google Fonts](#) and [fOnt.com](#) (for Thai fonts). Please keep in mind that these websites may change their terms in the future. It's a good idea to check the terms before implementing their content to avoid future problems.

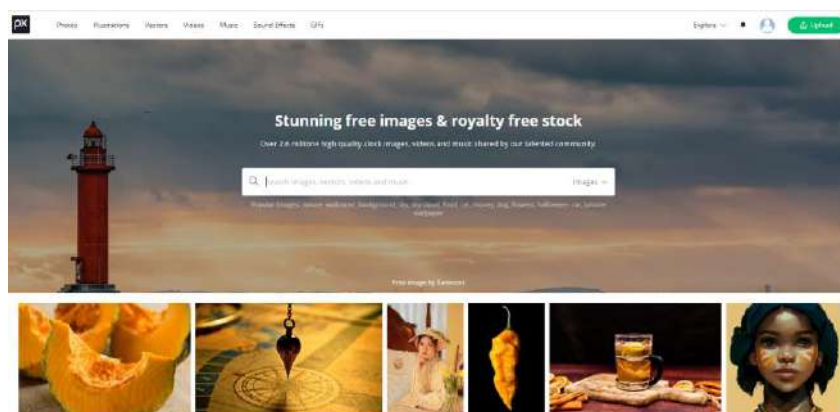


Figure 3.31 Royalty-free stock images

Source: Own screenshot showing [Pixabay](#)

3.3.2 Accessibility

No matter how well digital media is designed, keep in mind that some people may not be able to access it. One of the challenges of creating accessible digital media is designing it that is understandable to the visually impaired. The visually impaired can use a screen reader to narrate text, but the software is often unable to describe images or read text embedded in raster graphics.

Alt text

Designers can insert alternate text (alt attribute) to describe the image's appearance. The alt text is read aloud by the screen reader. Additionally, alt text is displayed instead of the image if it fails to load. If you try hovering the mouse pointer over **Figure 3.21** (assuming you are viewing this document in a PDF format), the alt text will appear, as shown in **Figure 3.32**.

As accessible media has become a global issue, today's software with image insertion functionality often includes tools for inserting alt text. Microsoft Word has this feature on the right-click menu (see **Figure 3.32**). Some Content Management Systems (CMSs) won't let you add an image without alt text unless the image is for decoration only.

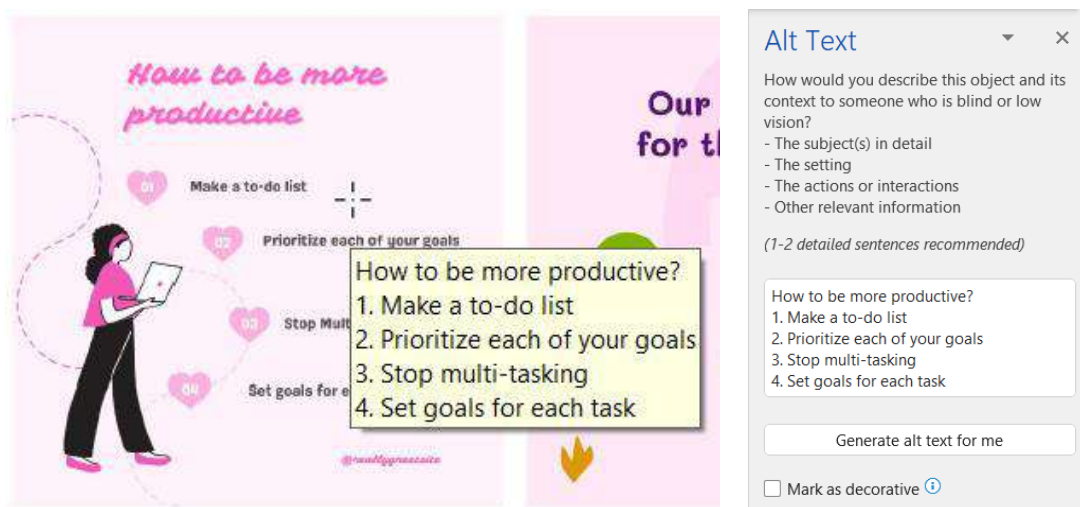


Figure 3.32 Alt text

Source: Own screenshot showing Word, contain templates from [Canva Education \(Terms\)](#)

Vector graphics

Another option for infographics with text is to use vector graphics designs and save and publish in a vector format (e.g., CSV or PDF). Take an example from **Figure 2.5**, where the embedded text is selectable, making it readable by screen readers ([World Wide Web Consortium, 2000](#)). Vector graphics can also be scaled without pixelation, allowing people with limited vision to enlarge the image for readability.

Narrated video

The visually impaired will not be able to understand the content if the video media just displays a demonstration without voice narration. This is comparable to how we only listen to the audio when watching a YouTube video. Accessible video media should include audio commentary so that it can be understood by those who can't see. Videos with narration are helpful for those who can't see, as well as those who can only perceive information through listening, such as people who are driving or cooking.

Subtitles and Closed Captions (CC)

Deaf and hard-of-hearing people cannot hear the narration. Thus, they must read the text to understand it. Common video editors often have a subtitle tool. Subtitles can be made into separate files (e.g., SRT or SBV) using a third-party program by specifying the message to be displayed and the start/end time. YouTube also has a tool to add subtitles (see **Figure 3.33**). Subtitles also benefit people who need to watch videos without sound and headphones, such as while on public transportation or in a library.

Another advantage of having a separate subtitle file is that it can be translated into other languages by binding to a language translator. If a video has a separate subtitle file in a particular language, YouTube can display subtitles in any language (see **Figure 3.33**), increasing its reach to a global audience.



Figure 3.33 YouTube subtitles

Source: Own work via [YouTube](https://www.youtube.com/watch?v=...), contain trademarks

Conclusion

Digital media is what can be displayed on any digital device. The primary digital medium consists of images, audio, video, and text, in which any design may contain multiple types of media.

Raster digital images, such as JPEG and PNG, save the image in a pixel grid format that might be pixelated if enlarged too much. Digital cameras generally record images in a JPEG format. Professional photographers prefer TIFF formats because the photos can withstand rigorous processing. PNG is preferred for pictures with a transparent background, such as logos and clip art, while GIF is mainly for animations.

Vector graphics describe images using geometric shapes, such as lines, arcs, and curves. Resizing won't cause them to become pixelated. Their characteristics make them perfect for storing typefaces and drawings. Some known vector graphics formats include SVG, EPS, and PDF.

Digital audio is created by sampling the original analog waveform at intervals. It is believed that human ears cannot distinguish between high- and low-resolution audio. Many digital audio formats, such as WAV, MP3, and AAC, are accepted by most common media players today.

Each digital video consists of separate video and audio tracks. A video, either digital or analog, is actually still images (frames) that are recorded/played continuously at a constant speed. The 24 frames per second are the industry standard. It is enough to trick human eyes into believing they are watching one continuous recording. Higher frame rates are for action movies, games, and slo-mo.

Digital text is stored as a character code in ASCII or UTF format. Plain text is readable across devices and platforms, but formatted text requires viewers to have a compatible program and font.

Infographics use images as part of presentations because humans perceive visual images better than text. Infographics can be used to announce important information (e.g., tsunami warning), to demonstrate how-to (e.g., how to wash hands properly), to show how things work (e.g., air conditioning system), to tell a story (e.g., company history), to present numerical data (e.g., charts and graphs), to encourage behavior change (e.g., stop smoking campaign), or to promote products or services (e.g., ad banner).

Infographics templates can be roughly categorized into a list, hierarchy, timeline, comparison, flowchart, structure, and chart. Many web applications offer free and paid infographics templates, such as [Canva](#), [Piktochart](#), [Venngage](#), [Infogr.am](#), and [Visme](#). Designing infographics should begin with a short brief. After that, the designer can start collecting information and make conclusive detail. Choose the appropriate template based on the information presented and start designing. Infographics should be tested on different devices to ensure they look great everywhere.

Although designing digital media today is easy due to the abundance of information available on the internet, designers should not be complacent about copyright. We must ensure that we have the right to use any content used in our design. We should consider choosing content in a public domain, with Creative Commons licenses, or content we have duly licensed in compliance with requirements such as attribution or non-commercial use.

Another point that should not be overlooked is accessibility. Designs should support the visually- or hearing-impaired by including alt text, voiceover, and subtitles.

Wrap-up Activity

- 1) Try searching for an image on free or paid stock photo sites.
 - a. See if you can differentiate between raster and vector graphics.
 - b. See how these sites offer the same image at different quality.
 - c. See the terms of use of those images.
- 2) Sign up for an infographic site, such as [Canva](#).
 - a. Look at what templates they offer.
 - b. Pick one and see what information you need to include in the design, such as an image, text, or website URL.
 - c. See the export options they have (e.g., JPEG, PNG, GIF, PDF, SVG, MP4, etc.). Think about what will best suit your design.
- 3) Try watching any video clip on YouTube, TikTok, or any video distribution site.
 - a. Listen only to the audio and see if you can understand what's being presented without looking at the screen.
 - b. Try again but mute the sound and watch silently.
 - c. Think about how you can improve the presentation so that the audience in the first two cases can understand the content.

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Lesson Plan: Chapter 4

1. Topics

- 1) Roles of social network and social media
- 2) Social media literacy
- 3) Social media trends

2. Learning objectives

By the end of this chapter, students should be able to:

- 1) Explain the role of social networks and social media in a global society.
- 2) Identify the popular social media platforms.
- 3) Use social media in a creative, safe, and beneficial way.
- 4) Analyze the current and future trends of social media.

3. Teaching methods and learning activities

Introduction

Have students complete an online questionnaire asking about the social media platforms they use, the time spent each day for different purposes, and their concerns about using social media. Display the overall results and discuss.

Presentation

- 1) Explain the difference between a social network and social media.
- 2) Describe social media for specific purposes and how to use them creatively, safely, and beneficially.
- 3) Describe some key social media trends at present and in the future.

Conclusion

- 1) Give the lesson summary.
- 2) Students review the lesson from the interactive courseware.
- 3) Students complete the chapter quiz.

4. Teaching materials

- 1) Instructional material: GEN0309 Digital Life
- 2) Presentation (PPTX)
- 3) Courseware (Moodle SCORM)

5. Assessment and evaluation

- 1) Participation in the class, online meeting, live stream, or meeting record
- 2) Participation in the discussions

- 3) Completion of an online questionnaire
- 4) Courseware attempts
- 5) Quiz score

Chapter 4

Social Network & Social Media

[Statista \(2022\)](#) states people's average time on social media was 90 minutes a day in 2012. That number increased to 147 minutes, or 2.45 hours per day, in 2022. The usage continues to grow significantly due to the COVID-19 pandemic ([Zanner, 2022](#)). These changing behaviors have opened up many opportunities for businesses to reach potential customers. Conversely, social media addiction is growing, harming people's health. The wise and secure usage of social media will be covered in this chapter.

4.1 Roles of Social Network and Social Media

Social networking describes relationships between individuals, groups, or organizations. For instance, A and B are friends and are members of the same group. Later, B meets C, a person from a different group. Members of both groups can get to know one another thanks to this social network. It is possible for information published by one group to spread to another. The illustration is displayed in **Figure 4.1**. There is a field of study called Social Network Analysis that focuses on the study of those relationships for use in many areas, be it business, politics, or medicine ([Freeman, 2004](#)).

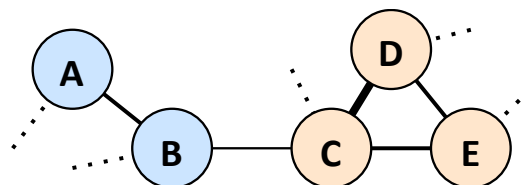


Figure 4.1 Social networking

Source: Own work using [diagrams.net](#)

Social media is a form of electronic communication, such as websites and microblogs, that act as online communities for sharing ideas, expressing opinions, and publishing content ([Schauer, 2015](#)). The relationships between individuals, groups, and organizations on social media platforms create a social network based on the concept above. [Boyd & Ellison \(2007\)](#) states that any social networking service allows the users to:

- 1) Create a public or private profile with restricted access.
- 2) List the other users they want to connect with and decide what information to be shared with them.
- 3) Check their and others' connections list within the system.

4.1.1 User-generated content

User-generated content is voluntarily created by the public, often published on various web pages and social media platforms ([Krumm et al., 2008](#)). Those content may be created for entertainment purposes (e.g., singing clips and game casting), to provide insights from real experiences (e.g., reviews of accommodations and restaurants), or to provide useful information (e.g., software techniques and video tutorials).

Such material is frequently offered without charge. However, content creators may receive certain benefits, such as praise for their efforts or career opportunities in the future. In addition, content creators may receive compensation from online advertisements or donations, which will be discussed further in **Chapter 5**.

4.1.2 Purposes of use

Here, we try not to categorize social media platforms into distinct types, as each may be built to suit different purposes. It is also up to users and communities to decide how to use the platform. Common purposes of use are as follows:

- 1) Social networking – We can use social media to keep in touch with friends, family, relatives, colleagues, etc.
- 2) Blogging – We can publish diaries, write journals, or share other informative content on social media.
- 3) Microblogging – We can write short posts to interact quickly with the audience. Posts tend to be short and concise to make it easier to write or read on a small-screen smartphone. Microblogs can also include audio, pictures, or videos.
- 4) Media sharing – Some platforms specialize in multimedia management, including smooth music, video streaming, and powerful search and recommendation systems.
- 5) Discussion – Anyone can ask a question or create a forum that will attract people with knowledge or interest in the topic to answer or comment. Some platforms allow anonymous Q&A.
- 6) Business – Social media is known to be a means of doing business from advertising, contacting and reaching customers, or even as a primary base of the business.
- 7) Marketplace – Like online marketplaces, social media platforms allow sellers and providers to offer products or services to a large target audience. Some platforms have dedicated classified ads functionality.
- 8) Customer review – People often question the credibility of online purchases because they do not see the product's or service's actual condition. Reviews from real users are one of the key factors that influence buyer confidence.

4.1.3 Notable social media platforms

Meta Platform

Facebook was founded in 2004 by Mark Zuckerberg and some other Harvard college students. Membership was initially limited to Harvard students and gradually expanded to the general public. Facebook entered the marketplace in 2012 with its initial public offering (IPO) of \$38, one of the biggest IPO in history. Earlier that year, the company acquired Instagram, an American photo and video-sharing service.

Facebook purchased WhatsApp, a well-known instant messaging service, in 2014. The company acquired Oculus (notable for its VR headsets) in the same year. The platform reached 1 billion daily active users in 2015. Facebook's peak market capitalization was \$1.08 trillion in 2021. That same year, Facebook founded the parent company "Meta" and established itself as a subsidiary.

In 2022, Meta lost \$232 billion as the company ignored its core businesses (Facebook, Instagram, and WhatsApp) and turned to the metaverse ([Sherman, 2022](#)). The timeline infographics by Statista ([Richter, 2022](#)) are illustrated in **Figure 4.2**.

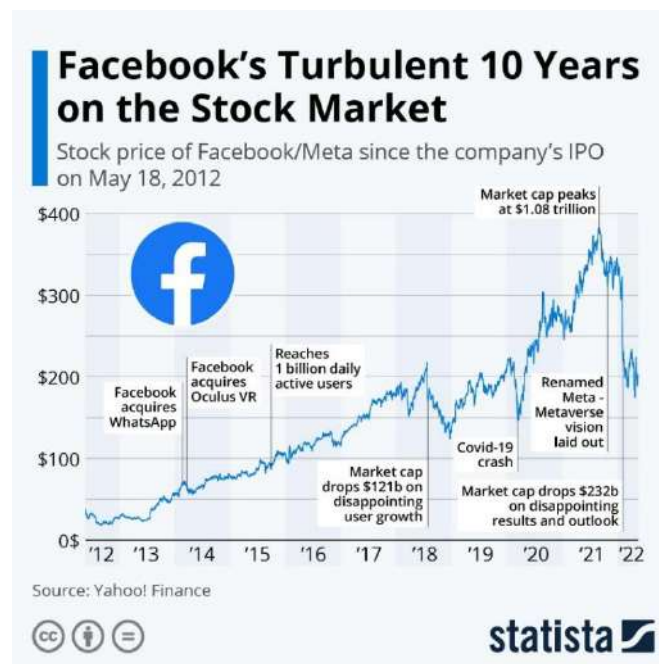


Figure 4.2 Facebook (Meta) timeline

Source: [Statista](#) (CC BY-ND)

Facebook is a general-purpose social networking service that provides all the necessary functions: posting, replying, reacting (Like), sharing multimedia, and private messaging (via the "Messenger" app). Video sharing is provided by Facebook Watch, while short videos are shared via Instagram Reel. Many businesses around the world use Facebook Pages as their bases. The platform also has marketplace functionality.

YouTube (by Google)

Google acquired YouTube in October 2012 for \$1.65 billion. In 2022, YouTube is a world-renowned video-sharing platform with over 800 million videos from 37 million channels. That same year, YouTube had more than 2 billion users, second only to Facebook. Visitor counts on youtube.com are more than 30 billion, second only to its parent company's website google.com ([Wise, 2022](#)).

Viewers can watch regular YouTube videos without registration unless the video has age or privacy restrictions. YouTube's main revenue initially came from advertising. Additional revenue models, such as YouTube Premium, were added later. YouTube allows qualified content creators (known as YouTube Partners or YouTubers) to earn revenue by displaying ads on their videos published on YouTube. Partners also earn a portion of a subscription fee when premium subscribers view their content. YouTubers who want to monetize their videos must strictly adhere to intellectual property, creative content, and privacy protection regulations. Detailed information is available on the [YouTube Partner Programme](#).

YouTube is very popular among children. It was found that 80% of parents with kids 11 and under let their children watch YouTube videos ([Fabian-Weber, 2022](#)). In January 2022, the [Baby Shark Dance by PingFong](#) (see [Figure 4.3](#)) became the first YouTube video that reached 10 billion views. Another kid video, "[Johny Johny Yes Papa](#)" by [LooLoo Kids](#), got the top 10 global views in the same year. With excellent reach, many creators were targeting the children's media market. At the same time, many people overlooked the community guidelines for children audience. Some creators published harmful content, violated kids' privacy, or advertised adult products. Since November 2019, YouTube videos targeting children audience are subjected to the [Children's Online Privacy Protection Act \(COPPA\)](#) and/or other applicable laws. Videos marked as "made for kids" will have several features removed, including comments, personalized ads, cards, end screens, notifications, and the ability to save to a playlist. Some creators may see a decrease in revenue. Detailed information can be found on [YouTube support](#).



Figure 4.3 Baby shark dance by Pinkfong

Source: [YouTube](#) (Fair use)

Twitter 

Twitter is a microblogging service operated by an American communications company. Users post and engage with Tweets, which were initially limited to 140 characters but increased to 280 characters in 2017. As of 2022, the majority of accounts have a 140-second limit on audio and video tweets.

Many celebrities and influencers use Twitter to announce updates to their followers. One of its main features is #hashtag, which allows users to follow specific topics. Businesses and communities can increase their presence by adding hashtags to their tweets. Users can check what is trending in the "Explore" section or via a third-party service, as shown in **Figure 4.4**.

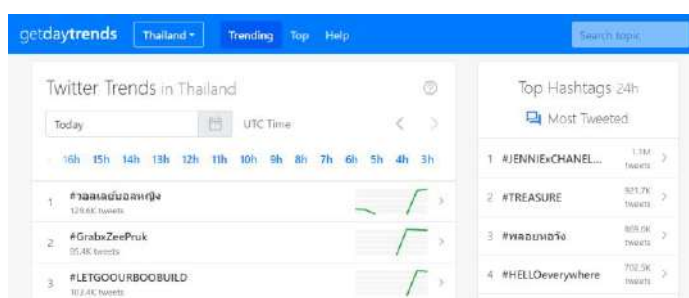


Figure 4.4 Checking Twitter trends

Source: Own screenshot showing [getdaytrends](#) (Terms)

Snapchat 

Snapchat (see **Figure 4.5**) was initially an instant messaging app. Users create "Snaps" multimedia messages and decide whether to make them public or just the selected contacts. The platform has tons of pre-built, user-created, and community filters that users can apply to snap or streaming. Users can create their own AR filter using the Lenses app.

One of its main features is that posted photos and messages have a limited display time before they become inaccessible. A collection of Snaps called "Story" will last 24 hours for most accounts. Businesses use this unique feature to build brand awareness as potential customers realize that deals or ads are short-lived and will soon be gone.



Figure 4.5 Snapchat

Source: [Google Play](#) (Fair use)

Pinterest

Pinterest is a social networking service that focusses on image sharing. The site reached 433 million global monthly active users as of July 2022. Its concept came from a pinboard where people can post public messages, ads, event announcements, or other information. An image (called "pin") can be uploaded directly to the site or linked from other websites and placed on the user's board. Boards usually have their themes, such as travel, shopping, or technology. **Figure 4.6** shows a Pinterest board displaying Christmas ideas. Users can follow and unfollow other users as well as boards.

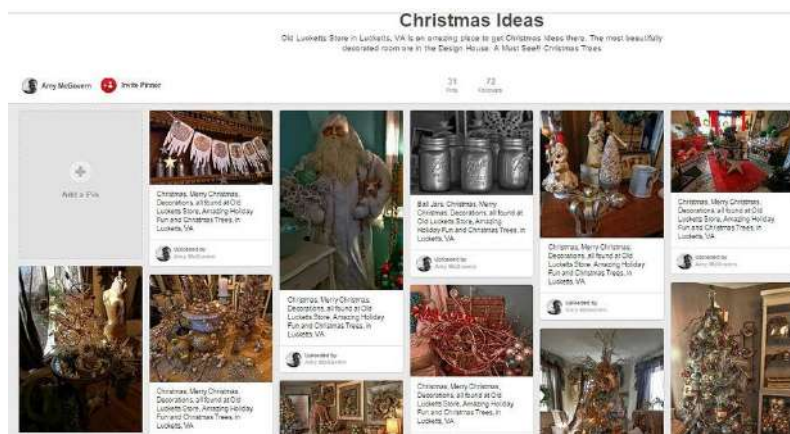


Figure 4.6 Pinterest board showing Christmas ideas

Source: [Flickr](#) (CC BY)

Reddit

Reddit is a news aggregator and discussion site. Registered users (referred to as "Redditors") post content, such as text messages, images, and videos. Posts are organized by a subject known as "community" or "subreddits" (see **Figure 4.7**). Viewers upvote or downvote the posts they view. Posts with more upvotes are pushed to the top of the subreddit. Posts that get enough upvotes will be featured on the website homepage. So for Reddit, the community decides what content is worth sharing.

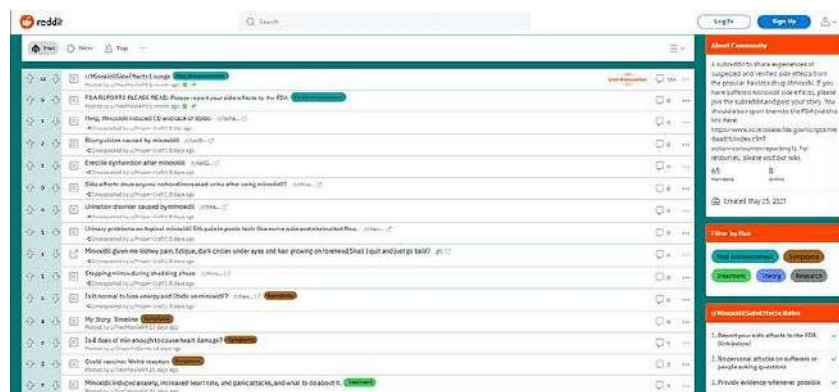


Figure 4.7 Subreddit

Source: [Wikimedia Commons](#) (CC BY-SA)

LinkedIn

LinkedIn (see **Figure 4.8**) is primarily used for professional networking. Job seekers will post their resumes and job profiles. Employers will post jobs and can purchase access to more profiles and tools. LinkedIn has been owned by Microsoft since December 2016. As of 2022, the platform reaches more than 800 million registered users from over 200 countries.

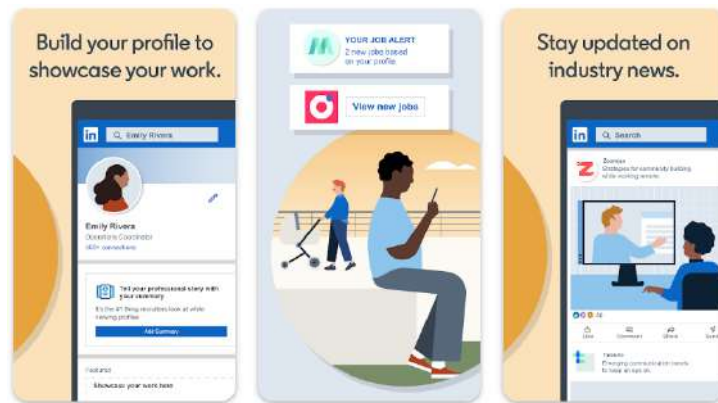


Figure 4.8 LinkedIn

Source: [Google Play](#) (Fair use)

Weixin/WeChat

Weixin is developed by Tencent, a Chinese multinational tech company. WeChat is the international version operated by the same company. Both apps feature instant messaging, social media, and mobile payment services (via WeChat Pay, see **Figure 4.9b**). As of 2022, the platform has over 1 billion active users from all age ranges.

In China, Weixin is known as an "App for everything," from communicating to business and marketing. However, signing up for WeChat outside of China involves an extensive verification process. In most cases, international users will need to ask an existing WeChat user to verify accounts (as of 2022).



a. WeChat

b. WeChat Pay

Figure 4.9 WeChat

Source: [Google Play](#), [Weixin](#) (Fair use)

Tencent QQ

Tencent QQ is another social networking service operated by Tencent. QQ services include online games, music, movies, and shopping, in addition to its instant messaging and microblogging functionalities (see Figure 4.10). As of March 2022, QQ has more than 563 million monthly active users.



Figure 4.10 Tencent QQ

Source: [Google Play](#) (Fair use)

Douyin/TikTok

Douyin is a short video-sharing platform owned by the Chinese company ByteDance. TikTok (see Figure 4.11) is an international version of Douyin. They both have almost the same user interface but no access to each other's content. Registered users post short videos with durations from 15 seconds to 10 minutes (as of February 2022).

TikTok videos span various genres but are mainly about pranks, stunts, challenges, tricks, jokes, and dance. TikTok reached the top downloaded app worldwide within a year after its launch in 2016. The TikTok app reached 2 billion downloads worldwide in October 2020. Like YouTube and other social media platforms, TikTok offers business solutions through business profiles and ads.

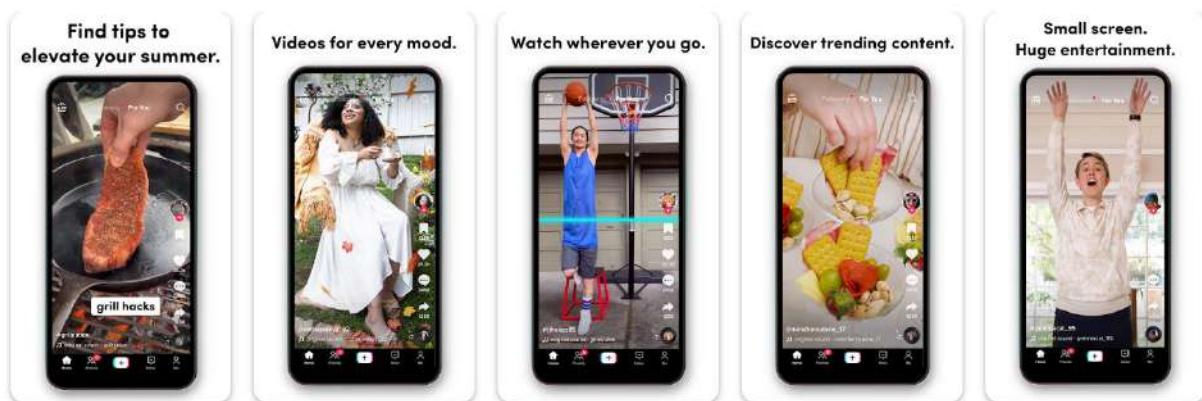


Figure 4.11 TikTok

Source: [Google Play](#) (Fair use)

Sina Weibo 

Sina Weibo (see **Figure 4.12**) is a Chinese microblogging site run by Sina Corporation. It is one of China's largest social media platforms, with more than 582 million monthly active users as of 2022. The platform achieved financial success with a market capitalization of \$30 billion at the beginning of 2018.

Many of Sina Weibo's features are similar to Twitter. Users can post up to 140 characters, which increased to 2,000 in January 2016. Mentioning other people uses the "@UserName" format. The double hashtag "#HashName#" format because there are no spaces between Chinese characters. The platform uses the verification symbol (V) for celebrities and corporate accounts to avoid impersonation.

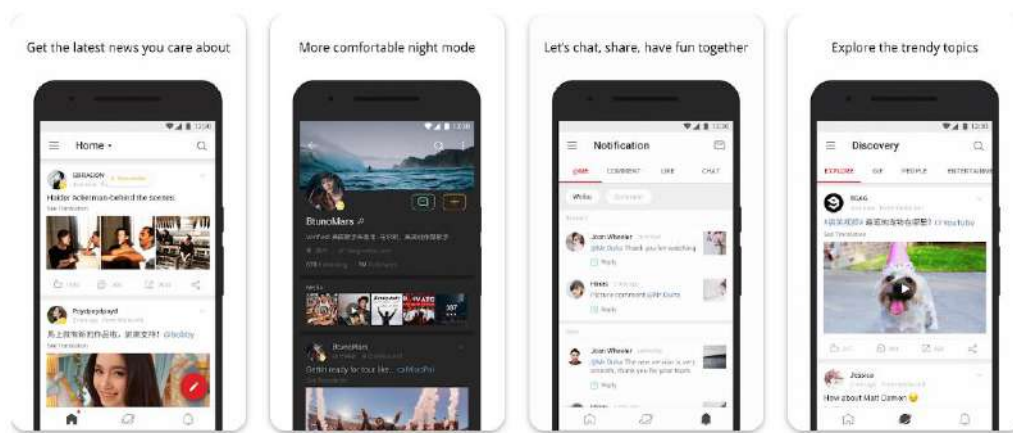


Figure 4.12 Sina Weibo
Source: [Google Play](#) (Fair use)

Kuaishou 

Kuaishou, known in overseas markets as "Kwai, " is another of China's short video platforms (see **Figure 4.13**). The platform is known for live streaming, especially for gaming and online sales, as content creators earn a revenue share if they have a large audience. Kuaishou also has integrations with e-commerce platforms, such as Alibaba and JD.com, allowing viewers to easily purchase products being presented.

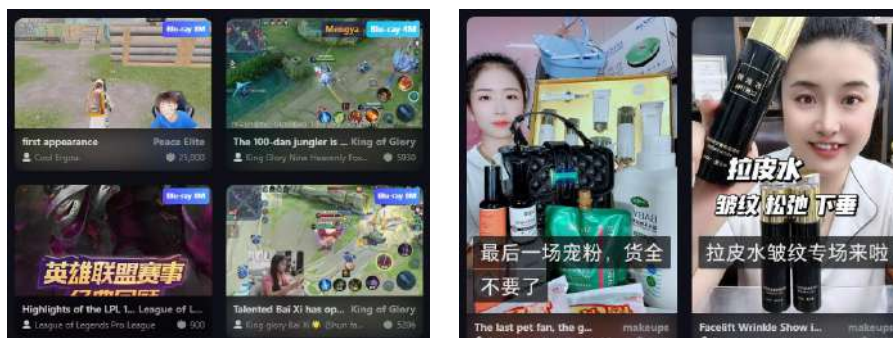


Figure 4.13 Kuaishou
Source: Own screenshot showing Kuaishou (Fair use)

VK 

VK is a Russian social networking service (see **Figure 4.14**). This app is available in multiple languages but is mostly used by Russian speakers. VK has common social media functions, including messaging, group chats, media sharing, posting and replying, and a public page. The platform also offers online games and organizes many events, such as music awards and festivals.



Figure 4.14 VK

Source: [Google Play](#) (Fair use)

Telegram 

Telegram (see **Figure 4.15**) is an instant messaging (IM) service operated by a Russian company but available worldwide. The platform provides end-to-end encrypted voice, video calls, and chats. Information is encrypted on both sides so that ISPs and other third parties on the network cannot access the data. Due to its anonymity, Telegram is favored by blockchain users and crypto traders.



Figure 4.15 Telegram

Source: [Google Play](#) (Fair use)

The following social media platforms were not listed as the top popular worldwide at the time this document was published. However, they are worth mentioning.

Line application

Line is an instant messaging service operated by a Japanese company. The app provides fundamental features, including text, voice, group chat, and video messaging. Users can also conduct VoIP conversations and video conferences. In addition, Line provides various services, including a digital wallet (Line Pay), news stream (LINE Today), short videos (Line Voom), and video on demand (Line TV). Line app is known for cute sticker messages (see **Figure 4.16**), which creators can design and sell on the platform. Line is the most popular messaging application in Thailand.

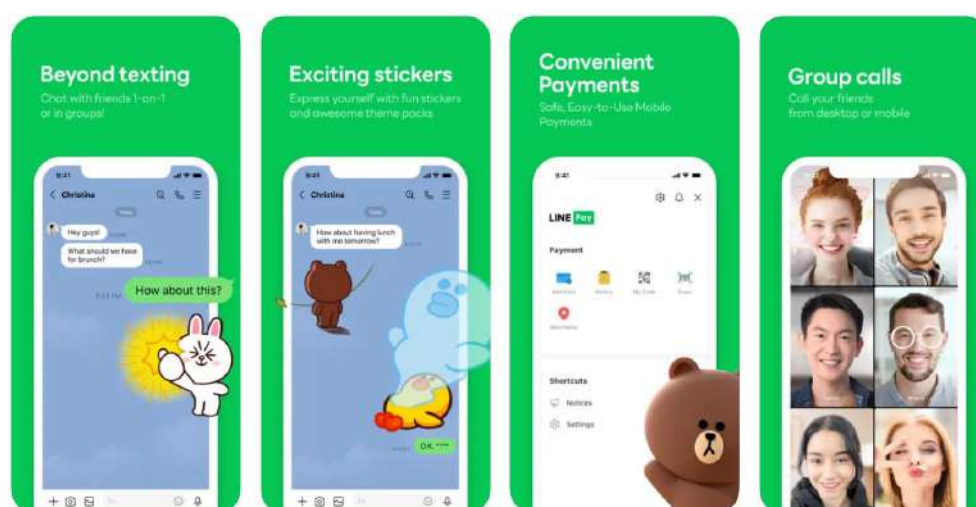


Figure 4.16 Line app

Source: [App Store](#) (Fair use)

Discord

Discord is a social media platform with common features like instant messaging, VOIP, video calls, and media sharing (see **Figure 4.17**). Users can communicate privately or in groups known as "Servers." Discord reached over 350 million registered users and more than 150 million monthly active users as of 2021.

Discord is known among gamers because of the various features it supports. Users can share their entire screen or a specific application window through live streaming. Many games have a feature where players can start a live broadcast right from the game. The platform features can be applied to a wide range of tasks not limited to gaming.

On the bad side, because the platform offers so much freedom, more and more people are using it for cyberbullying, distributing pornography, and using it as a base for violent activists. In response, Discord has deployed a team to monitor servers and respond to reports. The platform also relies on the cooperation of server moderators.



Figure 4.17 Discord

Source: [Google Play](#) (Fair use)

Twitch

Twitch is an Amazon subsidiary that provides live video streaming services focusing on video game streaming and broadcasting esports tournaments (see **Figure 4.18**). The platform also offers music broadcasts, creative content, and general streams. Depending on the streamer's setup, Twitch's content can be viewed live or on demand.

Twitch has a function that allows viewers to predict the match result using channel points (not real money). Viewers can donate to streamers through the platform and make a paid subscription to access exclusive content. For some events, viewers can donate money which will be added to the prize pool.



Figure 4.18 Twitch

Source: [Google Play](#) (Fair use)

4.2 Social Media Literacy

Social media platforms allow content creators to easily publish user-generated content without going through the extensive screening process as in the past. This is a way for some bad citizens to spread false information or harmful content. Even multi-layered protections, including community guidelines, moderators, and AI, might not be able to monitor the infinitely growing number of posts. On the other hand, engaging content can be addictive and cause viewers to spend too much time on it. Arslan & Topal (2023) defined social media literacy in several aspects, as follows:

- 1) The ability to produce social media content
- 2) The ability to access social media content submitted by others
- 3) The ability to analyze and evaluate social media content
- 4) The ability to use social media with a high level of consciousness and awareness

It can be seen that using social media, both for media creators and audiences, requires creativity and caution. This section will discuss the creative and safe use of social media.

4.2.1 Social media content strategy

Posting content on social media is as simple as typing a message or selecting a photo on your phone. However, creating engaging social media content is challenging, especially for businesses that want to reach potential customers. The process starts with choosing the issues that should be presented to graphic design and testing.

See what's trending

People tend to pay special attention to the issues that are going on in society. Posts within the hot issues are often more likely to get views and engagement than regular posts. Online tools like [Google Trends](#) and [Getdaytrends](#) (see **Figure 4.4**) provide insights into global trends or specific regions.

Many businesses take a stand on social issues. Airbnb aired an ad called "We Accept" (see **Figure 4.19**) after President Trump signed an order to temporarily close America's borders to refugees in 2018 in direct response to the decision. The ad shows a montage of people from different nationalities with the words, "We believe no matter who you are, where you're from, who you love or who you worship, we all belong. The world is more beautiful the more you accept. "



Figure 4.19 Airbnb took a stand on social issues

Source: [YouTube](#) (Fair use)

Some companies capitalize on trendy conversation, even when it has little to do with them. For instance, many online retailers included popular hashtags in their posts. Some hashtags were in reference to tragic occurrences like mass shootings or massacres. Some hashtags included names of famous people who weren't their brand ambassadors. According to [Kushwaha \(2019\)](#), businesses should attempt to link to social issues only if their actions are relevant to them, and they should not offend anyone.

Craft eye-catching infographics

Each user sees hundreds of thousands of social media posts per day. Presentations using infographics are ideal as audiences scroll through posts very quickly. Platforms like Facebook have functions that allow users to turn even a short message into a vectorized infographic (see **Figure 4.20**). Programs like Canva (see **Section 3.2**) can be used for more complex presentations.

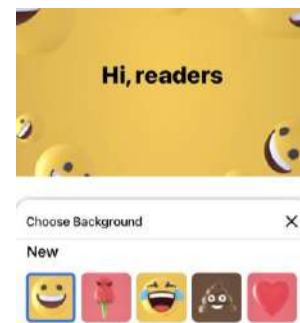


Figure 4.20 FB post

Source: Own screenshot

Write attractive captions

With viewers tending to skim through posts quickly, attractive captions will stop viewers from scrolling away. Combined with the selection of trending topics and stunning graphics, these posts will drive a lot of engagement.

Use videos if applicable

If a picture is worth a thousand words, then a video is worth a million. This quote is not far from possible. If we consider that each second of a video consists of 25 still images, a 40-second video will be equivalent to one million words. Video content is exciting but more complicated to create and requires skill. Video content is ideal for demonstrations or performances where still images and words are difficult to replace.

Media production

Posting original photos and video footage is not a common practice for many people. Everyone wants to appear attractive both in person and on social media. Unedited product images present an unprofessional impression to the general consumer. Every video recording usually contains mistakes that need to be fixed or reshot. Social media platforms are highly aware of the needs of these customers and frequently provide multimedia editing tools in their apps. You can also use several third-party media editing applications, like Meitu and CapCut video editor (see **Figure 4.21**).

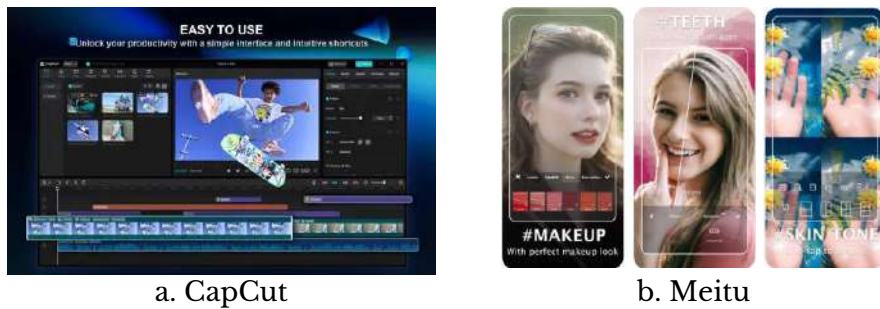


Figure 4.21 Video and image editing apps

Source: [App Store](#) (Fair use)

4.2.2 Critical analysis of social media posts

Social media is often used as a business tool because it makes it easier for shoppers to make decisions. Because social media posts inflict human emotions (as described in [Section 3.2.1](#)), some people use them to create panic. To further analyze how social media posts are affecting us, [McNulty \(2022\)](#) recommends asking ourselves five questions:

Who made that post?

Social media content is created by someone that may be an individual or entity. You can see examples of citations in this document. Each content has a reference where readers can verify who the creator is and how trustworthy they are. Although the author may sometimes inaccurately summarize the content, the reader can always check from the original source. Unverified content raises credibility questions.

Why was the post made?

Some media have a clear purpose, such as advertising material that states the product, price, and where it is sold (see [Section 3.2.1](#)). Some advertising techniques, such as viral video marketing, are conceptualized by creating a situation for people to talk about and later revealing it as a commercial video. [Figure 4.22](#) shows a viral video telling the story of an ice hockey team from Kenya dreaming of attending the Winter Olympics. The ad ends with a brand message that is connected to the company's values. Those looking outside the video frame should clearly see that the video was created and published by the Alibaba Group.

Why did it attract your attention?

Emotional content has the power to attract people. Some marketing campaigns have gone viral because they trigger strong emotional reactions among viewers, whether it be happiness, anger, fear, or sadness. For example, an insurance company might create an emotional story about an uncertain future to drive sales. Some people may make a poor life story to ask for donations. A lack of awareness that content creators are playing with the audience's feelings can lead to emotional purchases.



Figure 4.22 Viral video by the Alibaba Group

Source: [YouTube](#) (Fair use)

Will other people understand it the same way?

Social media users tend to be biased at some point, which is not uncommon, especially on sensitive issues such as politics or beliefs. Viewers may perceive some content differently depending on the level of bias, both the creators and the viewers. For example, building an industrial estate may increase employment, but environmental groups may disagree. An infographic showing the wildlife lost (see **Figure 4.23**) may be emotional, but those who support urbanization will see it differently.



Figure 4.23 Kids protest industrial estate

Source: [Freepik](#) (Licensed)

What's behind the content that we can't see?

As previously mentioned, some social media content is made under the brand's commission. And we know that the content was filmed and edited. There is something behind the scenes that we can't see, something that makes the content look much better than it actually is. **Figure 4.24** shows food photography, commercial vs. reality. Many people have revealed on the internet that advertisement food has been added with inedible ingredients, such as glue and engine oil, to make the photographs look good.

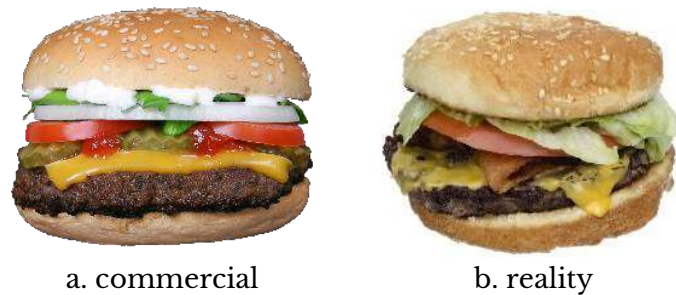


Figure 4.24 Food photography, commercial vs. reality

Source: Rawpixel [1](#), [2](#) (CC0)

4.3 Social Media Trends

Many websites have addressed social media trends in 2022 and beyond, such as [Tien & Prodanovic \(2022\)](#). Here we summarize some of the key trends agreed upon by more than three publishers.

4.3.1 Short-form videos will become a new normal

Viewers lose engagement over time while watching videos. According to data presented by vidyard.com ([Ellis, 2022](#)), if the total video length is longer than 20 minutes, more than 30% of viewers will lose engagement after viewing 10% of the total length. Less than 30% of viewers will watch the entire video if it is longer than 20 minutes. Short videos are better at keeping viewers engaged. From **Figure 4.25**, it can be seen that video lengths exceeding 10 minutes significantly affect viewer engagement.

For that reason, short video platforms like TikTok have grown in popularity. If we look at the growth rate of TikTok users, it can be predicted that the platform will soon overtake YouTube and Facebook. It would be wise for businesses to consider opening a marketing channel through TikTok, especially if their target audience is young consumers. However, long-form videos still play a role in terms of educational materials and TV shows. And YouTube will remain a competitive platform.

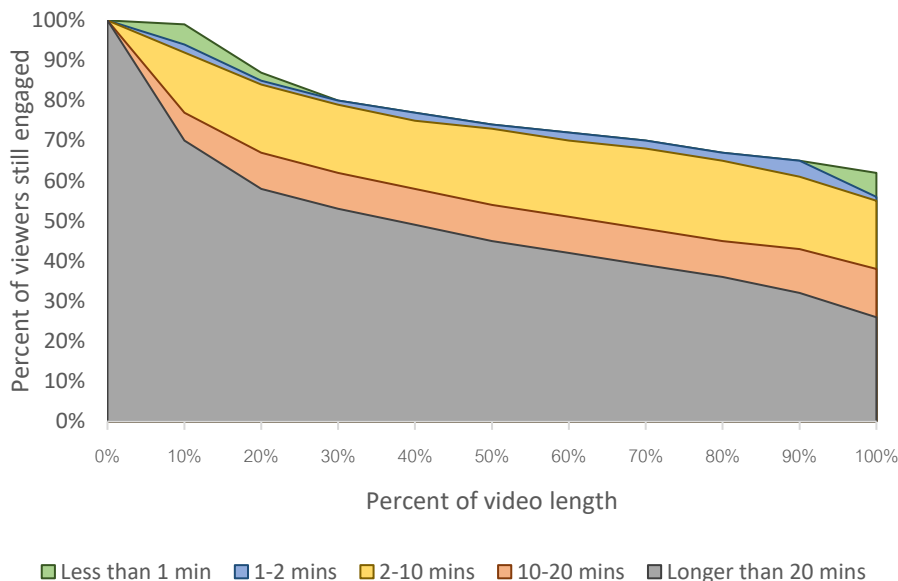


Figure 4.25 Engagement for different video lengths

Source: Regenerated from vidyard.com

4.3.2 Social audio can be a new strategy

In 2021, an unprecedented number of users joined the conversation on social audio platforms like Clubhouse. The involvement of many celebrities and influencers shows the potential of social audio. This increase in popularity may be partly due to the changing lifestyles of digital citizens who are receiving information through audio while doing other activities, such as driving or exercising.

The Clubhouse's popularity was declining for a number of reasons, such as being available only on iOS and requiring an invitation. However, leading platforms like Facebook and Twitter have experimented with creating audio-only spaces. Social audio may become more involved in the future.

4.3.3 People will stop making phone calls

Think about the last time you made a phone call. For some people, a phone call is only used when necessary or when calling is the only way to reach the person in need. In some areas, phone calls become costly because people have access to free internet. Instant messaging, VOIP, and video calling via social media apps have become more reasonable choices for contacting other people.

When people stop making calls, businesses need to extend their contact options through social media platforms (see **Figure 4.26**). Contacting via social media messaging is more convenient for many people. On the downside, potential customers often lose patience very quickly. If the contact is not responded promptly, they will lose interest and begin to look for other brands or stores that are more willing to answer.

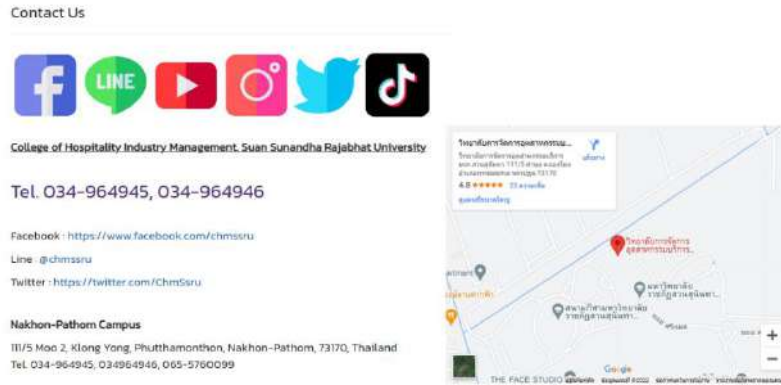


Figure 4.26 Business social contact

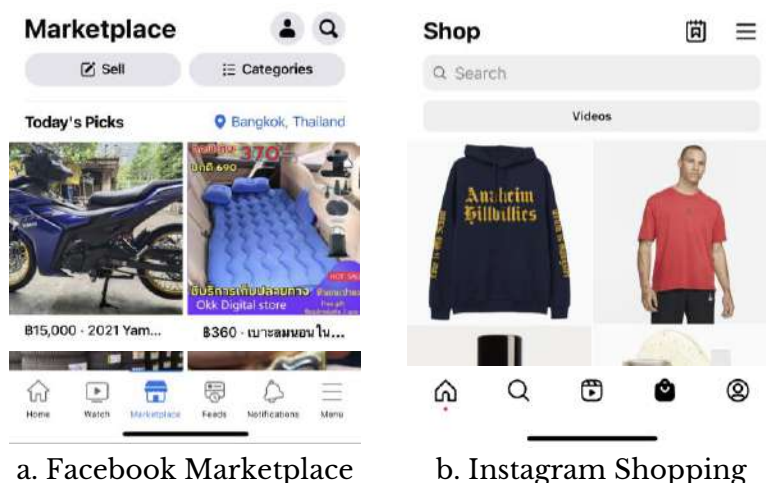
Source: Own screenshot showing [CHM website](#), contain Google Maps element ([Terms](#))

4.3.4 Paid ads will be mandatory, especially on small platforms

Having an online presence is vital for a digital business. Paying for advertising is an essential investment for firms to reach potential customers in the midst of intense competition. Due to intense competition, major platforms like Facebook and YouTube have reduced earnings per ad expense. Many companies, including giant ones, are trying to advertise on smaller platforms since they offer more profitable results at a lower cost.

4.3.5 Brands will invest more in social commerce

Social commerce is the act of making purchases directly from social media platforms without the need for intermediary services. The concept was inspired by research showing that consumers frequently forget what they are about to purchase or alter their plans if they have to switch to another app. Because of this, popular social networking platforms like Facebook, Instagram, and Pinterest are putting money into social commerce (see Figure 4.27).



a. Facebook Marketplace

b. Instagram Shopping

Figure 4.27 Social commerce

Source: Own screenshots showing social online shops (Fair use)

4.3.6 Creators and streamers have become recognized professions

Content creators earn a small portion of ad revenue (about \$0.01 to \$0.5) for every 1,000 views on YouTube, TikTok, Kwai, and Twitch. At this rate, you can earn a lot from advertising if you are a celebrity or influencer, or your content must be very attractive. However, those platforms also have other revenue streams. Selling things via live streaming is common. In addition, viewers can donate directly to creators or streamers through the platform, which may incur a small fee. Viewers can also subscribe to the channel for access to exclusive content. Successful streamers can make \$3,000 to \$5,000 per month from their subscribers on Twitch ([Geyser, 2022](#)). However, accepting a subscription is an obligation that creators will consistently produce professional content.

4.3.7 Influencer marketing will continue to grow

Channels with a large subscriber base are often the target of businesses to promote their products or services. Professional influencers can seamlessly integrate products into their regular content offerings (known as product tie-in).

Investing in influencer marketing is often cheaper than paid advertising but still gives good results. However, businesses require a sincere presentation of the product. Viewers often find that a product or service offered through an influencer is much better than what is offered to actual customers.

4.3.8 Posting requires social listening

Social media platforms generate a massive amount of data each day. Those data contain insights businesses will need, like what customers are searching for, what issues people are discussing, and which communities are talking about our business. Even if you're creating great content, it will be wasted if not posted in the right place and at the right time. Be it an individual or a business, posting strategies require social listening.

The Twitter trends in **Figure 4.4** is one of the insight tools. Such tools will help us quickly realize when people are talking about us or our business. Google Trends is another useful insight tool for businesses. **Figure 4.28** shows a comparison of searches related to Korean and Japanese cuisines in the United States over the past year (as of the date of writing this document). We can see from the results that the search "Japanese Cuisine" dominated only certain parts of the country. If you're doing content about Japanese food, you'll know where you should publish it. "Cucumber salad recipe" is a good idea to start creating content for the results shown in this example.

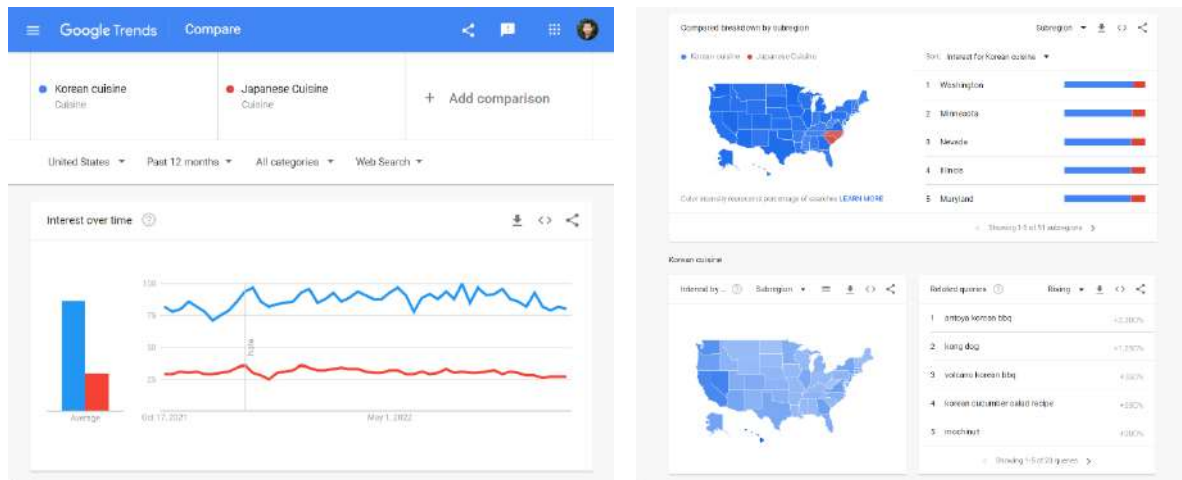


Figure 4.28 Google Trends

Source: Own screenshots showing Google Trends ([Terms](#))

However, no insider information is better than what we collect from our own place. Facebook Page admins can see audience engagement data (see Figure 4.29) and better determine the content types that appeal to viewers.

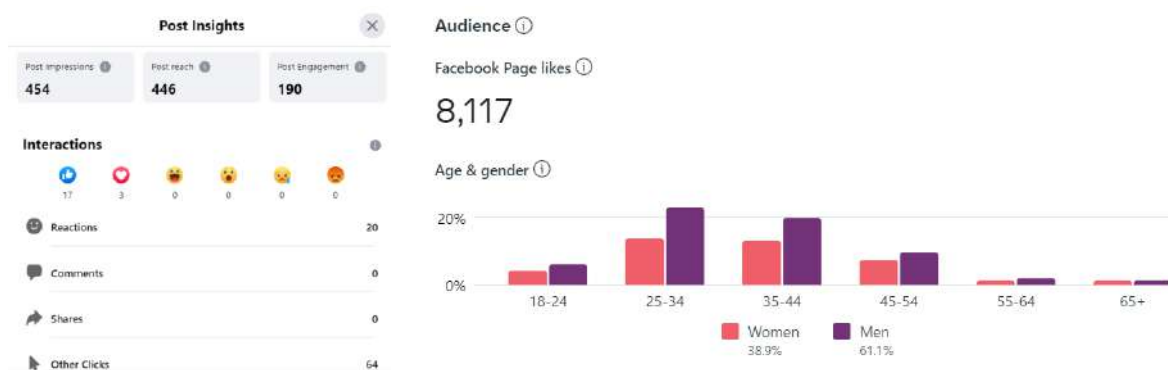


Figure 4.29 Facebook post and page insights

Source: Own screenshots showing Facebook Insights ([Terms](#))

Conclusion

Social networking describes relationships between individuals, groups, or organizations. Social media is a platform that facilitates social networks. Social media platforms typically have basic functionalities, such as posting & replying, private messaging, and media sharing. Some platforms introduce marketplace and integrated payment systems.

Posting on social media is easy, but finding the right and engaging content to share can be challenging. This process starts with finding out what's trending before going into production. There are many tools available, both free and paid.

While creators put a lot of effort into making their content outstanding, viewers must think critically about the creators of the technique used. Some content aims to drive emotional purchases. Some content has ad insertion seamlessly. Some content is so compelling that viewers may spend too much screen time.

Social media has become an essential communication channel for both individuals and businesses. Knowing how to create compelling social media and social media content strategy will give us an edge both as creators and viewers.

Wrap-up Activity

1) Have you ever used TikTok or Clubhouse? Give it a try if you have no idea what their communities look like.

2) Check out one of the YouTube or TikTok/Douyin channels you follow. Try to analyze the main factors that make it so popular.

- Does the channel distribute good-quality content that is worth following?
- Do you follow because of the MC's skill, because they're good-looking, or both?
- Does the channel have what you're looking for, and do they keep producing such content?

3) Pick one good social media content, which can be an image or a video, casual or commercial, and try to imagine what's behind the production.

- Are you familiar with the images or sound effects in those content?
- Can you figure out what program or application the creator used?

4) Consider the online community you're in, such as a Facebook page, a Line group, or a Discord server.

- Have the community's guidelines been announced?
- How often do inappropriate posts happen, and how are they handled?
- Does the community have moderators, or is everyone helping, or both?
- Is there a screening for new members who want to join?

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Lesson Plan: Chapter 5

1. Topics

- 1) Consumer behavior in the digital age
- 2) Digital business ideas
- 3) Financial technology

2. Learning objectives

By the end of this chapter, students should be able to:

- 1) Clarify consumer behavior in the digital age and explain how modern businesses can meet such needs.
- 2) Recognize new business ideas that emerged from a wide variety of digital technology.
- 3) Explain how modern financial technologies have transformed business operations in the digital age.
- 4) Safely use financial technology in everyday life.

3. Teaching methods and learning activities

Introduction

Have students complete an online questionnaire asking about their online purchases, payments, and problems regarding online shopping. Discuss the results.

Presentation

- 1) Describe consumer behaviors in the digital age and the things that drive the change.
- 2) Illustrate various digital business ideas and how they become feasible with digital technology coverage.
- 3) Describe some financial technologies, such as m-banking, e-wallet, and blockchain.

Conclusion

- 1) Give the lesson summary.
- 2) Students review the lesson from the interactive courseware.
- 3) Students complete the chapter quiz.

5. Teaching materials

- 1) Instructional material: GEN0309 Digital Life
- 2) Presentation (PPTX)
- 3) Courseware (Moodle SCORM)

6. Assessment and evaluation

- 1) Participation in the class, online meeting, live stream, or meeting record

- 2) Participation in the discussions
- 3) Completion of an online questionnaire
- 4) Courseware attempts
- 5) Quiz score

Chapter 5

Digital Economy

Digital technology has revolutionized the way people live. Social media, smartphones, and mobile banking are now considered necessities. People spend less time shopping in stores but locate what they want online and order them. Modern businesses must adapt to changing consumer behavior or the risk of collapse.

5.1 Consumer Behavior in the Digital Age

The internet and social media have led to the evolution of consumer behavior. Changing consumer behavior has created many opportunities, and challenges businesses must deal with. The more companies know about customer behavior, the easier it is for them to compete in the market.

5.1.1 Lazy economy

The term "lazy economy (懶人經濟)" originated in China before being adopted in Thai and global society. This term describes the behavior of consumers who do not want to leave the house but instead demand that products or services come to them at home. The business involved is not just online shopping or food delivery as we know it. Consumers also asked for house cleaning services, beauticians, haircuts, and even to bring expensive jewelry to try on at home.

Content-driven e-commerce

A significant aspect of the lazy economy is that consumers exclusively rely on their purchasing decisions on the data they find online. Having a reliable and well-designed online storefront has a significant impact on customer acquisition. Digital content for product introductions is unavoidable because customers might not get a chance to test the product until it is delivered to their homes.

For e-commerce, there is a relevant connection between digital content and purchasing decisions. Digital content enables potential customers to become familiar with the product and establish a connection with a brand before making a purchase. Airbnb is an excellent example of a company that benefits from content-driven strategies. They regularly change the website's appearance to match what visitors might expect. Good content helps potential customers to browse the website for a longer period of time in order to locate what they want. They will be able to locate the business even if they watch product recommendations elsewhere.

Electronic word of mouth (eWOM)

Online businesses rely on word-of-mouth referrals. The hashtags, as described in **Section 4.2.1**, are examples. These influences are significant for intangible products, like those in the hospitality and tourism industry ([Litvin et al., 2008](#)). For services like beauticians, massages, spas, catering, or pet care, a referral from other customers may be the best way to reach the target group.

Consumers rely on product reviews on e-commerce sites or comments on social media and video-sharing platforms before purchasing something they haven't tried. However, businesses cannot expect all reviews to be positive. Dealing with electronic word of mouth is essential for entrepreneurs in the digital age. What is more important is to offer products and services honestly, as well as sincerely address customer problems.

Smartphones and mobile applications

Operating a computer could take a lot of effort for lazy people. Smartphones have become essential for conducting business with these people. Browsers and desktop apps frequently have complex nested menus. The workflow for mobile apps has been simplified. Customers can browse products and complete transactions on a single device. Additionally, some smartphone capabilities are either absent or difficult for novice users to use on PCs.

GPS – The Global Positioning System is required to pin point the precise coordinate for the shipment or delivery. Smartphones use satellite radio navigation systems to locate and guide delivery personnel. Most computers derive their location from a public IP address issued by an Internet Service Provider (ISP), which is not as accurate as GPS.

Multi-factor Authentication – Mobile banking and other in-app systems use multi-factor authentication to enhance security, as described in **Section 1.2.3**. A registered smartphone can receive a One-time Password (OTP) to verify ownership. Also, current smartphones are equipped with a fingerprint or facial scanner to allow users to quickly and securely complete transactions without any need to type in a password or PIN every time. The biometric authentication will require additional hardware to be used with computers.

Camera – Not only are smartphone cameras useful for taking pictures. Digital citizens know the importance of mobile cameras for scanning and making payments. A cashless society would be impossible without such technology.

Mobile Network – We discussed earlier in **Section 1.2.3** that Wi-Fi is not a secured connection, especially public Wi-Fi. Some mobile banking features require users to connect to a mobile network (e.g., 4G or 5G) to perform transactional operations.

5.1.2 Sharing economy

The idea of the sharing economy is that businesses can offer some of their assets to others as an alternative for those who don't want to invest a lot. For example, a brand might run a classified ad in a newspaper for a small fee instead of investing in large advertising. Manufacturers who want to try out new products may rent a factory instead of building it.

Even in the digital age, this idea is still applicable. Modern people often do not want to spend money on things that take up too much space or need continual maintenance. One example is a cloud service, where users pay for as long as it is in operation and may discontinue when they no longer use it. Cloud services take little space and computation from the end devices and are maintenance-free. You might discover Google Workspace, Microsoft 365, Adobe Creative Cloud, and web hosting among the sharing services.

Another idea behind the sharing economy is that it enables people to make money from underutilized assets. They can be large items like homes and cars or small things like tools, toys, and clothes ([Tucci & Laskowski, 2018](#)). Customers can rent out things through sharing platforms like Uber or Airbnb.

5.2 Digital Business Ideas

A digital business is much more than an online store or e-commerce, although that might be the first thing anyone thinks of. Digital technology opens up many business opportunities, which we will cover in this section.

5.2.1 Digital business types and revenue models

Each type of digital business has distinctive characteristics. In addition, the means of earning are different, and there are options other than having customers pay for goods or services.

Online store

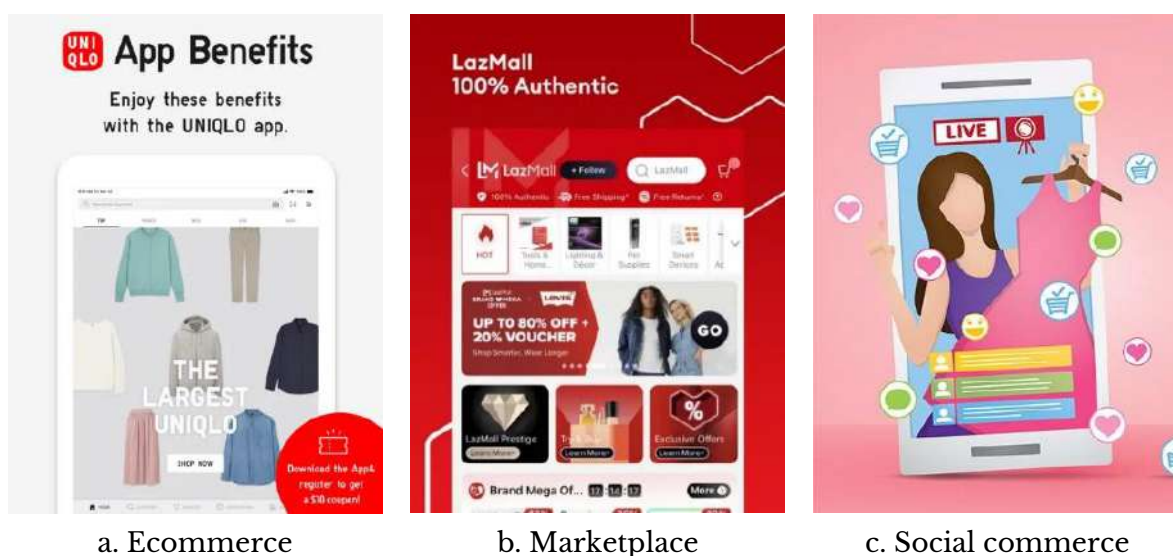
Online stores are known and have been with the society for a long time. There are several types of online stores, as follows:

1) Business-owned e-commerce website – Companies can build their own websites to market their own goods and services, as shown in **Figure 5.1a**. A fully-functional e-commerce website has a shopping cart system where shoppers can register, choose products from a list, specify shipping information, and make online payments.

2) Online marketplace – Building a website can be difficult and costly to maintain. An online marketplace, as shown in **Figure 5.1b**, has a decent and stable system suitable for selling products and offering services. Many stores establish themselves in an online marketplace, such as eBay, Amazon, and Shopee. Either buyers or sellers may be required

to pay a service fee. These fees could be charged as a fixed amount, a commission (%), or as agreed. Vendors take advantage of the platform's extensive customer base when selling on an online marketplace but may encounter intense competition from numerous identical products.

3) Social commerce – Selling through social media posts or live streams is trending (see **Figure 5.1c**). This sales channel is ideal for beginners because it involves little investment and technical IT knowledge. Social media also has a larger audience than e-commerce platforms. The success of social commerce merchants lies in their presentation and content production skills. Since social commerce frequently lacks a shopping cart or an integrated payment mechanism, trading primarily relies on trust.



a. Ecommerce

b. Marketplace

c. Social commerce

Figure 5.1 Online stores

Source: App Store (Fair use)

The revenue model for online stores is nothing more complicated than **sales**. The buyer pays the seller for the goods or services, including other fees such as shipping and import tax. The **subscription** model might work for regularly shipped items.

Matchmaking business

Originally, a matchmaking business referred to a dating service where members post profiles with the characteristics of the person they are searching for, and the system will suggest possible matches. The same principle applies to matching buyers and sellers. In the past, business matchmaking was often used for business-to-business trading as large-scale events where trading partners could meet. The agency may hold a tender for interested parties to place a bid or an offer. What is offered often includes raw materials, equipment, and professional services.

Digital technology makes this business model feasible for general consumer goods. Matchmaking businesses often focus on second-hand or rental items that cannot be sold on conventional e-commerce platforms. Operations can be as follows:

- 1) Sellers post product offers, and buyers choose from the available options., or
- 2) Buyers post product attributes they are looking for, and sellers reply with offers, or
- 3) Buyers and sellers each post their offers, and the system suggests possible matches.

Matchmakers frequently do not own the goods bought and sold, but sellers keep the goods with them. The company facilitates the exchange between supply and demand and collects a **transaction** fee on successful matches. Airbnb is a great example. Providers can offer their accommodations for rent, and travelers can search. The company acts as a broker who charges a commission from each booking. None of the houses on Airbnb's list are owned by the company.

Fastwork is a digital matchmaking business for hiring freelancers in southeast asia (see **Figure 5.2**). Their services range from graphic design, photography, programming, language translation, language proofreading, and more. Freelancers can post their work profiles, and employers/customers can search. The platform has a system for generating quotations and electronic contracts with legal effect. Wages are covered until the employer verifies that the final product is in accordance with the agreement. Like other online stores, Fastwork has a rating system for both freelancers and employers to support decision-making on future deals.

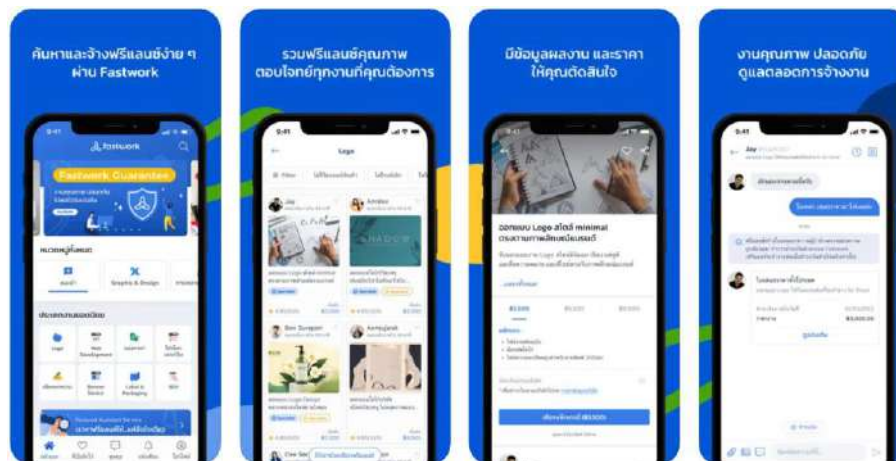


Figure 5.2 Fastwork

Source: [App Store](#) (Fair use)

The challenge of matchmaking businesses is the balance between buyers and sellers (the same concept as market equilibrium). The platform cannot succeed if one party is more dominant. The platform owner may offer rewards to one side, such as a fee reduction for sellers or a referral fee to buyers to maintain the balance.

Content-based business

Content-based businesses involve content creators and distributors. They generate income from producing and distributing digital media, such as ebooks, photos, videos, and music. The advantage of content-based businesses is that their products do not require complex inventory management and logistics. Digital content requires almost no physical storage space and can be delivered instantly over the internet. Revenue may come from the sale of licenses. Creators can submit their content to be sold on several platforms, such as Shutterstock (see **Figure 5.3**) and iStock.

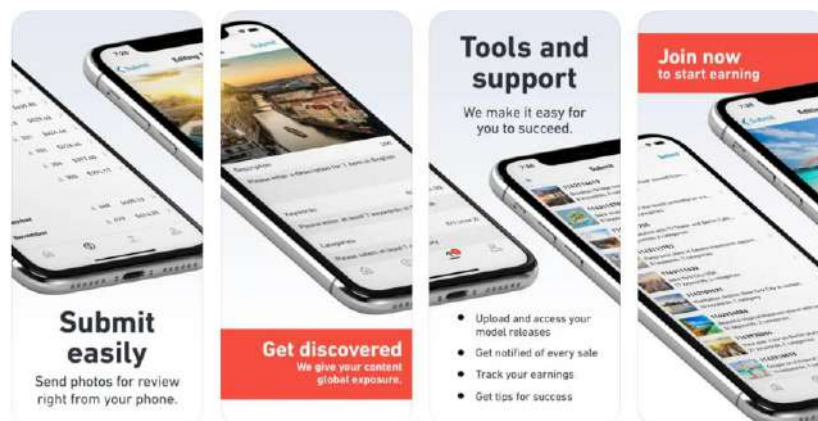


Figure 5.3 Stock photos selling platform

Source: [App Store](#) (Fair use)

In addition to selling content directly, producers may choose to distribute content free of charge but rely on donations. This format is ideal for hobbyists or newbies who want to build a reputation, as free content has a lot of traffic. **Figure 5.4** shows a download page of [Pexels](#), a royalty-free photo website. The descriptions indicate that the photo is free to use and attribution is not required, but users can make a small donation or follow the creator as a thank you message.

Say thanks to RODNAE

Our creators love hearing from you and seeing how you've used their photos.
Show your appreciation by donating, tweeting, and following!



Figure 5.4 Royalty-free photo with donation option

Source: Own screenshot showing [Pexels](#) ([Terms](#))

Revenue may come from outsourcing from brands or other entities. A well-known creator with a large number of followers is indeed the target of brands to promote their businesses through ad production or product tie-in, as described in **Section 4.3.7**.

The **subscription** model works for creators who regularly post new content as buyers prepay in anticipation of continued future product releases. Subscriptions usually imply permission to view and use all content covered in the package. Some video-on-demand (e.g., [Netflix](#) and [Viu](#)), stock photo websites (e.g., [Freepik](#)), and stock templates (e.g., [Canva](#) and [Slidemembers](#)) offer subscriptions. **Figure 5.5** shows Freepik subscription plans as of October 2022.

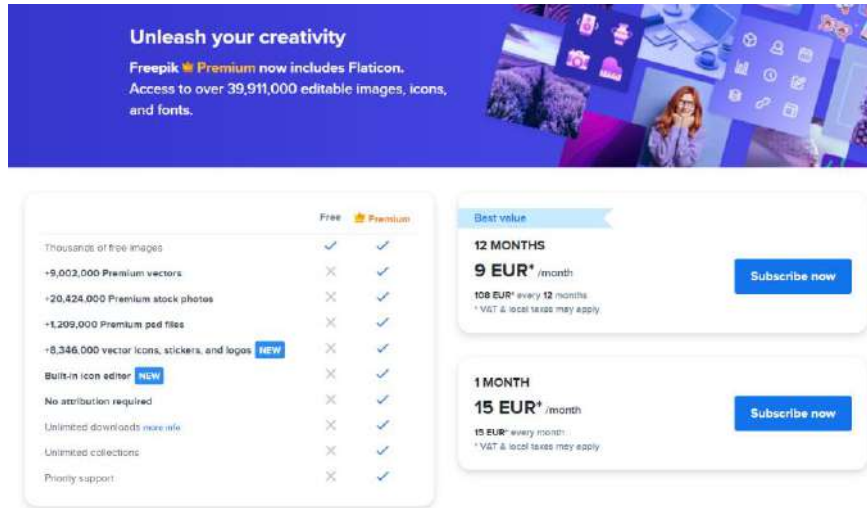


Figure 5.5 Subscription plans

Source: Own screenshot showing [Freepik \(Terms\)](#)

Nevertheless, the most common revenue models for content-based businesses are **advertising** and **affiliate marketing**. Qualified YouTube content creators (YouTubers) can monetize their videos by participating in the [YouTube Partner Programme \(YPP\)](#). Owners of content websites or blogs can earn money from Google Ads by linking their accounts to [AdSense](#) and pasting the code received on their web pages. Website owners who have subscribed to AdSense can track their progress and earnings through the dashboard, as shown in **Figure 5.6**. More ad providers are available worldwide.

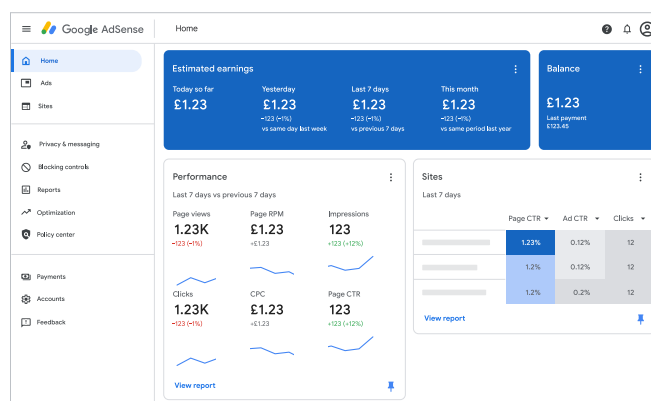


Figure 5.6 Ad dashboard

Source: Screenshot showing [AdSense \(Terms\)](#)

Some types of ads generate revenue for content owners when they are displayed, but the income may be very small. Unskippable video ads earn slightly more. Significant revenue generation comes from **affiliate marketing**. The website owners earn ad revenue when the audience clicks the ad on the referral's website that links to the target website (often an online store) and makes a purchase or performs revenue-generating actions (e.g., subscribe or enter contact information).

Creators may publish free content that they will not immediately monetize but may lead to future revenue-generating activities. Many online courses offer free content. However, learners must pay to issue a certificate or have grades in a credit bank. As mentioned above, posting free content on social media or royalty-free photo sites gives a large audience the opportunity to see your work and potentially lead to future employment. This type of revenue is known as an **indirect** revenue model.

Promotional service

Even if the product or content is great, a business can't generate income if potential customers can't find it. A promotional service helps other businesses improve their online presence. This type of digital business is often recognized by the "Search Engine Optimization (SEO)" technique, which examines weaknesses within the website structure and makes suggestions for improvements.

In addition to SEO, promotional services also help attract visitors and keep them in touch with their clients by taking advantage of coupons and special offers. These services are also professional in organizing online ads, increasing chances of reaching potential customers. Businesses can use promotional services even before the official launch to have a ready online presence.

Promotional services often have sub-elements such as website decoration, content creation, and back-end systems. **Sales leads**, **affiliate marketing**, and other **indirect** revenue models are often good options. Providers may offer free consultations or for a small fee and generate additional income by referring affiliate businesses.

5.2.2 Website and social media profile for business

Digital businesses may be based on their own websites, social media, e-commerce platforms, or elsewhere. But no matter what platform a digital business primarily uses, having a website under a brand's domain name is essential for the following reasons:

- 1) The website URL is frequently included in the profile, regardless of the platform (see **Figure 5.7a**). No matter how big or small the business is, a business card must mention the company's website. Such information is necessary to verify the business identity and build trust with visitors.

2) A website is where businesses can set their own revenue model, whether focusing on selling goods or posting content supported by ads. Businesses using a shared platform, such as social media or e-commerce, are subject to the terms of service and are not free to control their revenue generation.

3) When users look up a certain company, search engines typically display the website before the social media profile.

Modern digital businesses often utilize both website and social media platforms. Content is first posted on the website, then shared on social media. The audience will be directed to the website, which businesses can freely control. The company still benefits from a large user base on social media. **Figure 5.7b** shows a BBC News Facebook post where the content was published on the BBC website, and its URL was then shared to Facebook. Viewers must click on the thumbnail to be directed to the BBC's website, where they may read the complete news, giving the company control over monetization and page analytics.



a. FB profile



b. FB post

Figure 5.7 Website as part of a social media profile/post

Source: Own screenshot showing [CHM FB page](#) and [BBC News FB post](#) (Fair use)

5.3 Financial Technology

Financial technology (known as "FinTech") is used in various financial services such as deposits and withdrawals, payments, loan applications, investments, etc. The technology is part of the digital transformation that agencies and business units use to improve workflow efficiency, reduce paper usage, and reduce communication errors.

Financial technology is replacing most of the traditional financial activities that require manual labor. According to the [Bank of Thailand \(2022\)](#), domestic commercial banks terminated their services at more than 400 branches and service points in the past year. As discussed in this section, consumers are adopting new financial technologies.

5.3.1 Digital banking and digital wallet

Digital Banking is an umbrella term that includes online banking and mobile banking ([DBS Digibank, 2021](#)). Online banking, previously known as internet banking or i-banking, refers to any banking operations that can be performed over the internet. Users make transactions by logging into the bank's website via a web browser on a desktop or laptop computer. Mobile banking is done through a mobile application. It does much of the same as online banking and adds a number of features that are only available on smartphones (described in **Section 5.1.1**), such as biometric authentication, getting an OTP via mobile text message, and using GPS to find an ATM or branch.

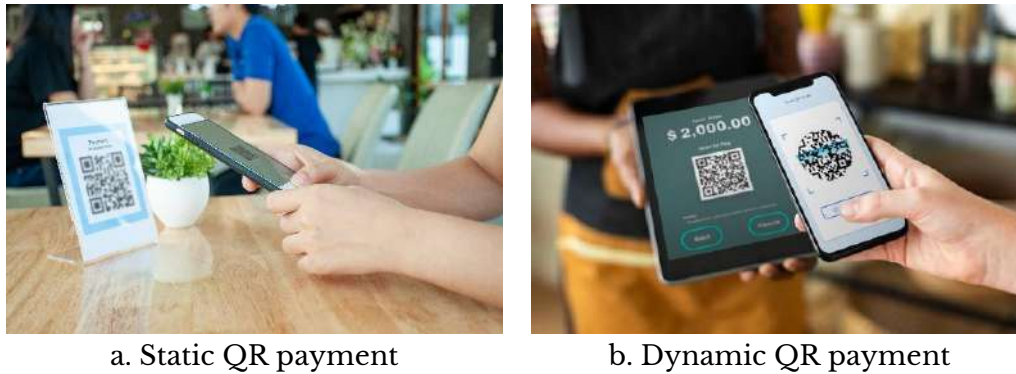
Transactional and non-transactional operations

Typical online and mobile banking operations can be classified into two types. The account balance will be affected by transactional operations such as cash withdrawals, money transfers, bill payments, etc. Fund transfers are not a part of non-transactional operations, which include checking account balances, setting spending limits, adding favorite payees, etc. An additional level of security is frequently needed for transactional operations. You might be prompted by the bank service to re-enter your password, complete an OTP verification, or have your Wi-Fi connection turned off.

Digital wallet

A digital wallet, also known as an e-wallet, is a form of transaction operated by non-bank financial services. Registered users can top up their digital wallets to spend at stores and perform other transactions in the same way as online banking. In addition, users can link their credit cards or bank accounts to their digital wallets. Payments can be made by scanning a QR code, as shown in **Figure 5.8**.

- A static QR code (see **Figure 5.8a**), generated only once for each payee account, is usually printed out and placed near the cashier or checkout counter. The customer scans the code with the e-wallet app, enters the amount manually, and confirms it. Merchants must manually verify the payment by checking the statement or through the account notification alert.
- Only dedicated Point of Sale (POS) systems or other mobile banking apps can generate dynamic QR codes, as shown in **Figure 5.8b**, for accepting payments. In this case, the payable amount will be specified by the payee and embedded in the code. Once scanned, the customer cannot edit the amount, and the merchant's POS terminal will receive a confirmation once the payment has been received.

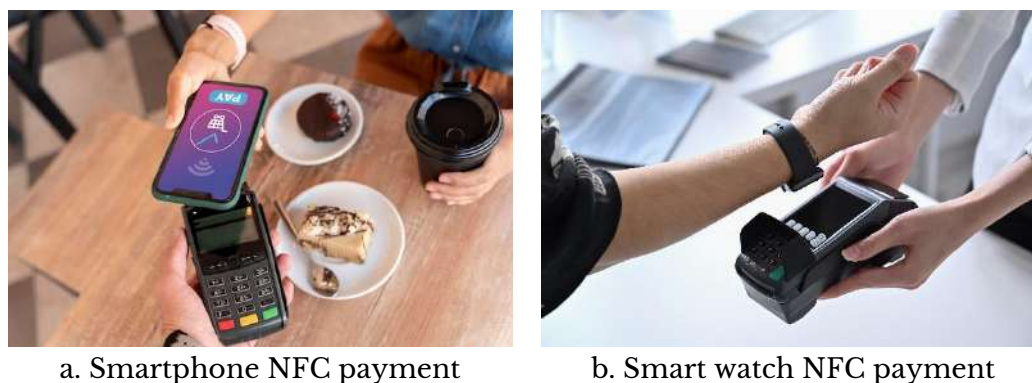


a. Static QR payment

b. Dynamic QR payment

Figure 5.8 E-wallet QR paymentSource: [Freepik](#) (Licensed)

Payment can be made via Near-field Communication (NFC), as shown in **Figure 5.8**, for compatible smartphones, POS terminals, and e-wallets. NFC payments resemble contactless credit card transactions. Customers present their smartphone, smartwatch, or dongle within 4 cm of the POS terminal and initiate the payment with their digital wallet app. To validate a transaction, the app might ask for multi-factor verification, such as a password or biometric scan. By setting the payment type and the maximum payment amount, the user can skip the identity verification process for payments that need to be made quickly, like fare or transit payments.



a. Smartphone NFC payment

b. Smart watch NFC payment

Figure 5.9 E-wallet NFC paymentSource: [Freepik](#) (Licensed)

Paying via e-wallets is more beneficial than making a direct payment via a bank account or credit card. E-wallet service providers often collaborate with merchants to organize promotions or loyalty programs such as electronic membership and point-collecting cards (see **Figure 5.10a**). E-wallets allow businesses to gather customer insights.

Digital wallets can be used to verify the holder's identity. In some countries, retailers have the right to check whether clients are allowed to purchase regulated items like cigarettes, alcohol, or adult products. Digital wallets may also hold driver's licenses, health cards, and other identifying documents (see **Figure 5.10b**).

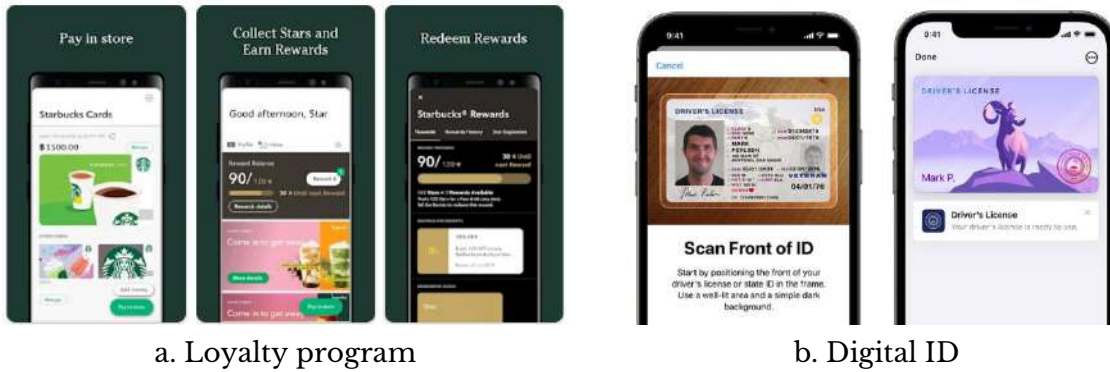


Figure 5.10 E-wallet functionalities

Source: App Store showing [Starbucks Thailand](#) and [Apple Wallet](#) apps (Fair use)

Precautions for using digital banking

Transactions are made easier by digital banking, but misuse can have catastrophic consequences. We will discuss several methods for using digital banking safely in this part.

1) Mobile banking is more secure than internet banking considering that we often do not share our mobile phones with anyone else. Furthermore, a connection made using a mobile network (4G or 5G) is safer than one made using Wi-Fi or Ethernet. Some financial apps demand that users be connected to a mobile network when performing transactional operations. If you must use online banking, log out after each session and use incognito mode (or private browsing).

2) Only download financial apps from legitimate stores, the App Store for iOS users and Google Play for Android users. Verify that the app developer is the same as the provider, and see if there is a reasonable number of downloads (see **Figure 5.11**). Do it yourself. Don't let the store, repair shop, or other people install financial apps for you. Don't download anything from the link that someone else sent you. Installing from.apk or installation files obtained from other sources may also be risky.



Figure 5.11 Mobile banking app

Source: [App Store \(Terms\)](#)

3) Do not modify the operating system. Software used for jailbreaking, rooting, or cracking may contain malware. Some financial apps can disable themselves if they detect that the device's operating system has been modified.

4) Create a strong password. A password should not be something that is obvious to others and should only be known by you. Following are some wise password suggestions:

- A secure password should be a combination of uppercase English, lowercase English, symbol or non-English characters, and numbers.
- It should have at least eight digits, depending on the device and platform.
- It should not be anything about you, such as name, date of birth, or ID number.
- Do not use repeated numbers or sequences, such as 1111 or 12345678.
- It shouldn't be a word from a dictionary, such as "apple" or "computer."
- Use a different password for each service, especially the primary email account you use to recover passwords for other services.
- Phone unlock codes should not be used with other services.
- Remember your passwords. Don't write them down. A password that you cannot remember is not a good one. There is an exception for the crypto wallet private key, which will be discussed in the next section.

5) Set spending limits to minimize losses. Conventional digital banking apps allow users to set multiple spending limits per account, including (1) cash withdrawal limit, (2) transfer limit, and (3) payment limit. Some apps separate online and in-store payments.

6) Consistently review your account statements. A transaction notification service is typically included in banking apps to inform the user when a transaction has taken place. You may choose a minimum transaction amount for notification. Setting it to zero will allow the system to alert you every time a transaction occurs.

7) Avoid clicking on suspicious links that are sent to you by email, SMS, or instant messages. Digital banking users are often the victims of fraud that send messages via email, text message, or social media. Such messages often prompt users to panic or rush into decisions without careful consideration. **Figure 1.10** is one example. **Figure 5.12** is another example showing fraudulent messages with harmful links sent through mobile SMS.



Figure 5.12 Fraudulent msg.

Source: Own screenshot

5.3.2 Blockchain and cryptocurrency

Centralized, decentralized, and distributed systems

Financial services are frequently centralized. In other words, the bank or financial service provider functions as a hub that stores all of the customer's account data (see **Figure 5.13a**). The central node reviews each transaction and determines whether to approve a request. Information on the account's balance and the requester's transaction eligibility is necessary.

Centralized operations give banks complete control over handling consumer accounts and investigating suspicious activity. However, a centralized network provides room for fraud and theft because the central node has substantial authority. In addition, the crash of the central server will affect the entire system. Some of you may have experienced digital banking crashes on every payday, as there are more transactions than the server can handle.

A decentralized system is appropriate for a large network that may be broken into smaller nodes, each of which can independently manage resources (see **Figure 5.13b**). Each sub-node makes its own decisions, with no single node taking the lead. The sum of the decisions made by each node makes up the final decision. The bottlenecks that frequently occur when there are numerous concurrent transactions involved are eliminated in a decentralized system. The whole system is not affected by a single node's inactivity. Multiple nodes may work on the same transaction in the system, though this can lead to redundancy.

A distributed system consists of multiple network devices that work together (see **Figure 5.13c**). Tasks are broken down into sub-tasks and distributed to each machine to compute. Each machine stores and shares the data. The reliability of distributed systems is well recognized. The overall system is hardly ever affected by a single defective device. Additionally, since we can compare the data to that stored on other machines, it is challenging to covertly modify the data.

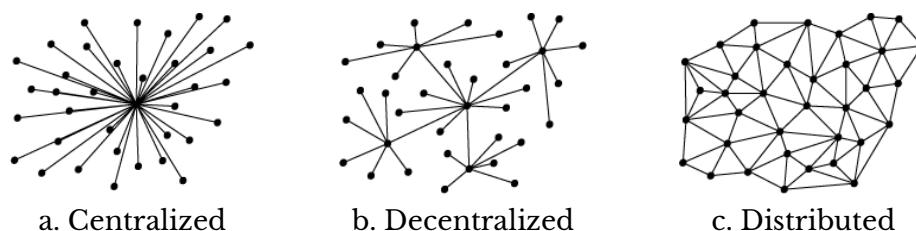


Figure 5.13 Centralized, decentralized, and distributed systems

Source: [Wikimedia Commons](#) (CC BY-SA)

History of blockchain and cryptocurrency

The origins of blockchain are still controversial. But the first decentralized blockchain technology was known to be invented by an anonymous user (or a group of people) known as Satoshi Nakamoto in 2008. Nakamoto discovered a method to validate transactions without needing a commercial bank or other financial institution to give its approval. The concept was implemented the following year as a core component of "**Bitcoin**," the world's first cryptocurrency. Following that, more cryptocurrencies were developed, including Ethereum and Tether (see **Figure 5.14**). However, they cannot compete with Bitcoin in terms of novelty and popularity. Other digital assets besides Bitcoin are collectively referred to as alternative cryptocurrencies, "altcoins" or "alt coins."



Figure 5.14 Cryptocurrencies

Source: Own work using diagrams.net, contain trademarks

How blockchain works?

Blockchain has other applications besides cryptocurrencies. However, we will explain the principles based on transaction handling for a better understanding.

1) Each customer creates an account called a **"Wallet."**

2) Each wallet keeps the records of all transactions, called a **"Public Ledger."** The data does not show the account balance directly. However, it can be inferred from the difference between the total received and paid amounts.

3) Each wallet is identified by an address, called the **"Public Key,"** and the signature or secret called the **"Private Key."** Each contains 26 – 35 alphanumeric characters.

- The signature can be decrypted into its address. And it is used to verify the ownership of the wallet.
- The signature cannot be decrypted from its address. If the owner loses the signature, that wallet is lost forever. Users often keep their private keys in secured hardware or engrave them on a metal plate, as shown in **Figure 5.15**.



Figure 5.15 Private key hardware and metal plate

Source: [Freepik](https://www.freepik.com) (Licensed)

4) Each transaction generates a code that will be used for validation. Such code requires a lot of processing power to decrypt. Transactions won't be validated individually. Instead, multiple transactions will be accumulated into a **"Block"** with the reference data of the previous block.

5) There will be a group of people called "**Miners**" who volunteer to validate transaction blocks using GPU-powered computing devices or other tools dedicated to mining (see **Figure 5.16**).

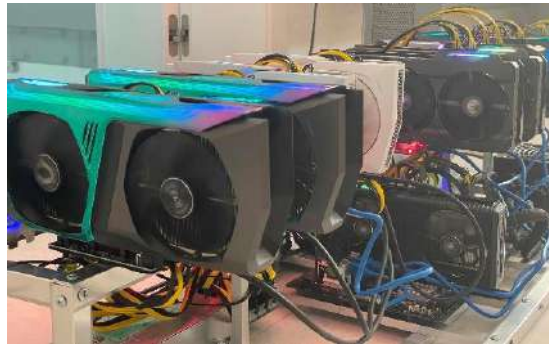


Figure 5.16 Cryptocurrency miner

Source: [Freepik](#) (Licensed)

6) If more than 50% of the members agree that the block is valid, it will be permanently connected to the previous block, called a "**Blockchain**." The public ledger will be publicly visible, and the first miner who successfully validates the block will be rewarded.

7) Any block having invalid transactions will be rejected, and the miner will not be rewarded. Transactions will be removed from the block and regrouped. The validation process will be repeated, and the problematic transactions will eventually be ignored.

8) As the validation process requires massive processing power, it is difficult for miners to work independently. In practice, miners often join mining pools and split the reward based on the resources they participated in.

9) If two or more miners (or mining pools) successfully validate a block at the same time (within a microsecond), the chain will be split (see **Figure 5.17**). They will compete to find connected blocks, and smaller chains, called "**Orphan blocks**," will eventually be discarded. The blockchain will be just one long chain in the end.

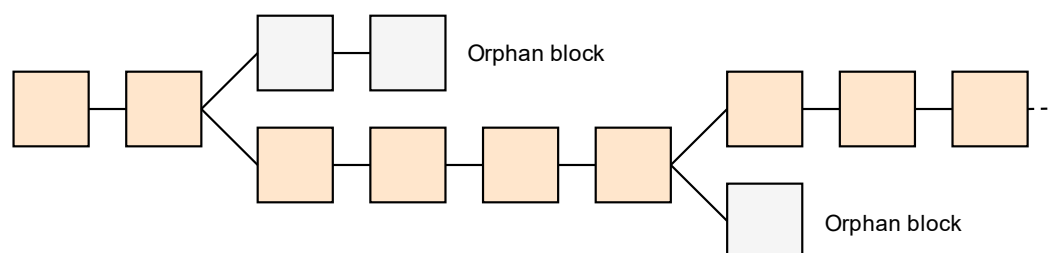


Figure 5.17 Blockchain with orphan blocks

Source: Own work using [diagrams.net](#)

From the explanation above, it can be seen that the blockchain operates as a **decentralized** system in which several mining pools compete and exchange data while public ledgers are **distributed** among all users.

Concerns about blockchain and cryptocurrencies

Here, we will refrain from weighing the benefits and drawbacks of blockchain technology and cryptocurrencies because what one group considers to be advantages is frequently viewed as a drawback by another. We can list some of the following concerns about blockchain technology and cryptocurrencies that many people have:

1) Cryptocurrencies are generally not regulated by banks or governments. Interest rates and government policies, such as sanctions, do not apply to cryptocurrencies. That makes cryptocurrency exchange rates very volatile (see **Figure 5.18**). However, trading still involves agencies that exchange between digital and real currencies, keeping part of the trades regulated.

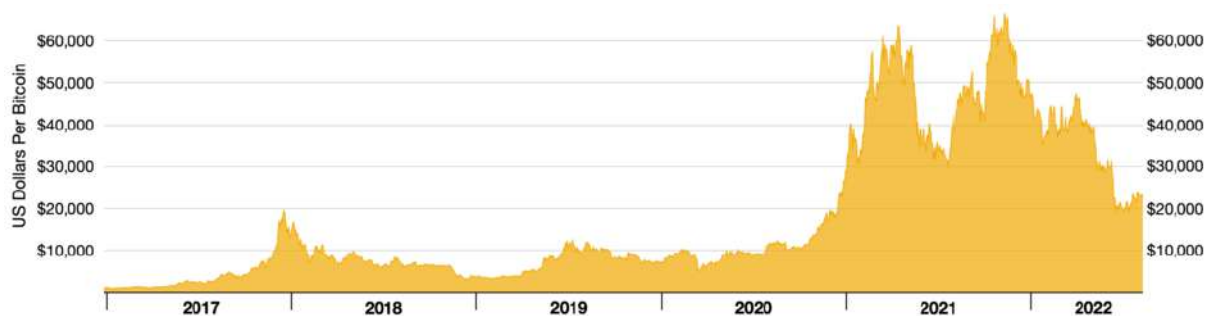


Figure 5.18 Bitcoin historical prices

Source: [Wikimedia Commons](#) (CC0)

2) Public ledgers and crypto wallets do not contain the identity of their owners. The entire process involves anonymous transactions. As a result, cryptocurrencies offer a way for criminals to transfer money without being discovered.

3) Crypto mining needs GPUs that are typically utilized for gaming and graphics tasks. Due to the popularity of cryptocurrencies, some GPU models have been completely sold out, causing shortages in supply and increasing prices.

4) The crypto mining process consumes a lot of energy, resulting in increased demand for electricity and waste of resources.

Other blockchain applications

Blockchain has strong transaction validation that is difficult to counterfeit, which makes the technology applicable to many tasks beyond cryptocurrency.

1) Blockchain is used in elections using the same principles as cryptocurrency fund transfers. Voters use digital wallets to transmit their votes to the candidates they want to support. The anonymous aspect of the blockchain prevents people from identifying the voters. Any anomaly will be discovered during the validation process. Improper votes will not be processed and will be removed from the blockchain.

2) The same principles can be applied to the grading system. Teachers grade students by transferring points from one wallet to another. Anyone can check but will not know who the grade owner is. With the blockchain system, grades cannot be modified arbitrarily.

3) Storing data in a centralized manner means that data may be exposed as hackers can exploit a single weakness. Blockchain technology can be used to secure a system or device by decentralizing the administration ([Singh, 2021](#)). Storing data using blockchain is almost impossible for hackers to access the database. Blockchain technology can also be used to monitor activities to protect data from unauthorized access.

4) Proving ownership of digital assets is difficult. Even in the physical world, proof of ownership can be destroyed or forged. Non-fungible Tokens (NFTs) allow creators to record the authenticity and ownership of their work. Digital arts, as shown in **Figure 5.19**, are examples. Proving ownership of digital assets, regardless of jurisdiction, allows creators to maintain full rights to their media ([Groopman, 2022](#)).



Figure 5.19 Digital art NFTs
Source: [Wikimedia Commons](#) (CC0)

Conclusion

Consumers in the digital age emphasize the convenience of shopping and consuming digital media. Businesses need to adapt by increasing mobile access, which is the primary channel for reaching consumers. As many digital devices are being made smaller and updated all the time, many consumers decide not to own digital products. Instead, they rely on renting services to fulfill their requirements and discontinue use anytime without obligation.

Most digital goods can be instantly delivered to customers online and don't need much physical storage space. These characteristics create possibilities for alternative revenue streams apart from sales. Businesses can create and share digital content for free while generating online advertising revenue. The platform may serve as a venue for buyers and sellers to meet and collect service or transaction fees. The website may generate income through affiliate marketing by referring partner companies or services.

Again, mobile banking rules the market when it comes to online transactions. Businesses must offer a variety of payment methods to serve clients in the digital age. There will be no sales if mobile payment support is disregarded. Even if mobile banking is convenient, there are still security measures to take. Users should only download apps from legitimate stores, use a strong password, and avoid suspicious links.

Cryptocurrency is a new type of transaction using blockchain technology that does not go through an intermediary but relies on a validation process involving cryptography. Blockchain technology is independent of centralized control but is traceable and strong against counterfeiting. On the one hand, blockchain and cryptocurrency are misused as users remain anonymous. It also consumes power and leads to shortage of some essential equipment.

Wrap-up Activity

- 1) Consider the online shopping process and see how mobile phones play a role.
- 2) Are there any online services or programs that you pay monthly or annual fees instead of buying?
- 3) Browse some websites that offer free photos, such as [Pixabay](https://www.pixabay.com/) and [Pexels](https://www.pexels.com/), and analyze how websites and content creators earn money. Do they use the same revenue model as other stock photo websites like [Shutterstock](https://www.shutterstock.com/) and [iStock](https://www.istock.com/)?
- 4) Check whether the passwords you use with financial services are safe (Section 5.3.1). It is recommended to change them if found to be unsafe.
- 5) How are credit card payments, direct transfers, and digital wallet payments different (from consumer and business perspectives)?
- 6) Find out more about what blockchain technology can do in addition to those mentioned above.

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Lesson Plan: Chapter 6

1. Topics

- 1) E-commerce and digital commerce
- 2) Launching a new e-business
- 3) Buying and selling things online

2. Learning objectives

By the end of this chapter, students should be able to:

- 1) Differentiate between e-commerce and digital commerce.
- 2) Distinguish different types of digital commerce.
- 3) Explain how digital commerce business works.
- 4) Explain the process of launching a new digital commerce business.
- 5) Shop and sell physical and digital products online efficiently and safely.

3. Teaching methods and learning activities

Introduction

1) Display results from the previous questionnaire that asked about students' online purchases. Discuss how they evaluate their options (e.g., when seeing multiple shops offering the same item).

2) Ask if they received any recommendations from online or social media ads. Question on how the platform determines relevant products

Presentation

- 1) Explain the difference between traditional e-commerce and digital commerce.
- 2) Describe the essence of data-driven e-business.
- 3) Explain the process of launching a new e-business.
- 4) Explain what to consider when buying or selling online based on the information previously discussed.

Conclusion

- 1) Give the lesson summary.
- 2) Students review the lesson from the interactive courseware.
- 3) Students complete the chapter quiz.

4. Teaching materials

- 1) Instructional material: GEN0309 Digital Life
- 2) Presentation (PPTX)
- 3) Courseware (Moodle SCORM)

5. Assessment and evaluation

- 1) Participation in the class, online meeting, live stream, or meeting record
- 2) Participation in the discussions
- 3) Courseware attempts
- 4) Quiz score

Chapter 6

Digital Commerce

The internet has changed the way consumers shop. Businesses use websites and social media to reach potential customers. Even consumers themselves have the right to offer a portion of their unused assets to others for rent through online channels. Processes such as electronic money transfers, marketing, supply chain management, and consumer data analytics can all be performed online. In this chapter, we will build on the knowledge we learned in the previous chapter by focusing on buying and selling.

6.1 E-commerce and Digital Commerce

E-commerce is a way to sell products online where sellers place their items on the platform. Buyers come in to choose the products they want and pay. The seller verifies the order and payment and ships the items to the address specified by the buyer. The common workflow is illustrated in **Figure 6.1**.



Figure 6.1 E-commerce workflow

Sources: Own work using [Canva Education \(Terms\)](#)

Digital commerce is an extension of traditional e-commerce. It shares common e-commerce features plus some additional features as follows ([Mudsa, 2022](#)):

6.1.1 Inclusion of digital products

E-commerce is basically selling physical products. Hence, it is inevitably associated with logistics and warehousing. Digital commerce covers selling digital goods like ebooks, stock photos, software, and applications. Such products can be delivered online without the need for logistics and warehousing.

A platform for selling digital products works differently than a typical e-commerce website. They have to deal with not shipping or inventory but controlling the purchaser's right to use the products. That is to ensure that buyers cannot share items they purchased with others, which will result in revenue loss.

6.1.2 Self-service and automated workflow

Digital commerce focuses on self-service, whether purchasing physical or digital goods. The process is designed to be automated with minimal human intervention. Digital products are coding-based. Hence it does not seem difficult to automate the process. Selling physical products can be done through an **e-commerce fulfillment service**. The workflow, as shown in **Figure 6.2**, is described as follows:

- 1) The seller ships the goods to the fulfillment service provider's warehouse. Goods can be shipped directly from the factory or supplier to the warehouse.
- 2) The seller lists products in the online store and links them with the fulfillment service's back-office system.
- 3) When a buyer places an order and pays in an online store, the order will be forwarded to the fulfillment service, which will do packing and shipping.
- 4) The seller still has the responsibility of marketing and customer service.

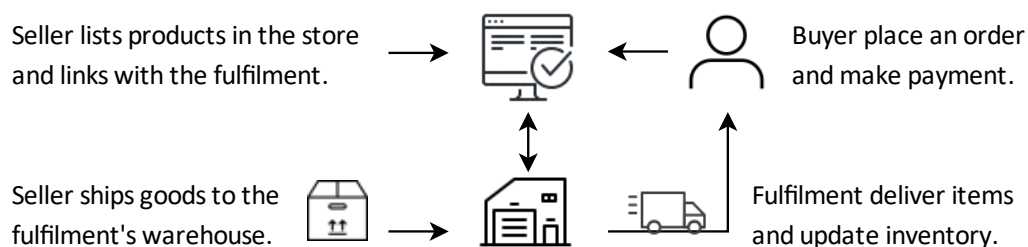


Figure 6.2 Fulfillment service workflow

Source: Own work using diagrams.net

Digital commerce allows buyers to shop online without leaving their homes. On the seller's side, e-commerce fulfillment services allow them to manage their entire business without leaving their homes as well.

6.1.3 Everyone can trade

Many people know e-commerce as one-way trading, where sellers offer products and buyers make orders. It was discussed earlier in **Section 5.2** that digital business has more possibilities than that. Digital commerce may be classified based on how transactions are made, as follows:

- 1) Business to Customer (B2C) – The most recognizable form of digital commerce follows the characteristics outlined above. That is, the business supplies goods for sale, and consumers come to buy them.
- 2) Business to Business (B2B) – Producers often rely on suppliers of raw materials and things needed for production. Retailers usually pick up goods from another wholesaler. Even digital content businesses or online services rely on third-party services, often involving the cloud, servers, or software. Business-to-business operations are

different from trading consumer products. We often do not see B2B products being sold in stores where shoppers can add items to their shopping carts like a typical e-commerce website. B2B operations are often done through agents or consultants. The "Contact Sales" button can roughly tell us that the company is offering the product or service B2B.

3) Consumer to Customer (C2C) – Based on the concept of the sharing economy discussed in Section 5.1.2, consumers in the digital age can offer to sell used items or rent parts of their unused assets to others. In addition to that, consumers can also offer their expertise, such as language proficiency or video editing skill, to serve other members. Digital matchmaking businesses tend to focus on C2C services.

4) Consumer to Business (C2B) – C2B business has several forms. The first form is similar to C2C, only that the buyer is an entity or organization. The second form is a reverse auction whereby consumers present their desired scope of work or expected product and allow businesses to bid. Another form involves online advertising, whereby social media users with a large number of followers or high-traffic websites offer businesses their own space to rent to advertise.

5) Government-related business – Government agencies can get involved in a business either as a supplier, a buyer, or both. The G2C model generally refers to non-profit social welfare. The "Paotang" application, as shown in Figure 6.3, is an example of a G2C business. Paotang, literally in Thai, is a digital wallet where Thai citizens can exercise their rights under government support measures. B2G refers to trade between businesses as suppliers and government entities as customers, often through bids. C2G occurs when an individual sells products or services to a government entity. G2G refers to trading between government agencies. Government-involved trades often have strict regulations such as median prices and bidder qualifications.

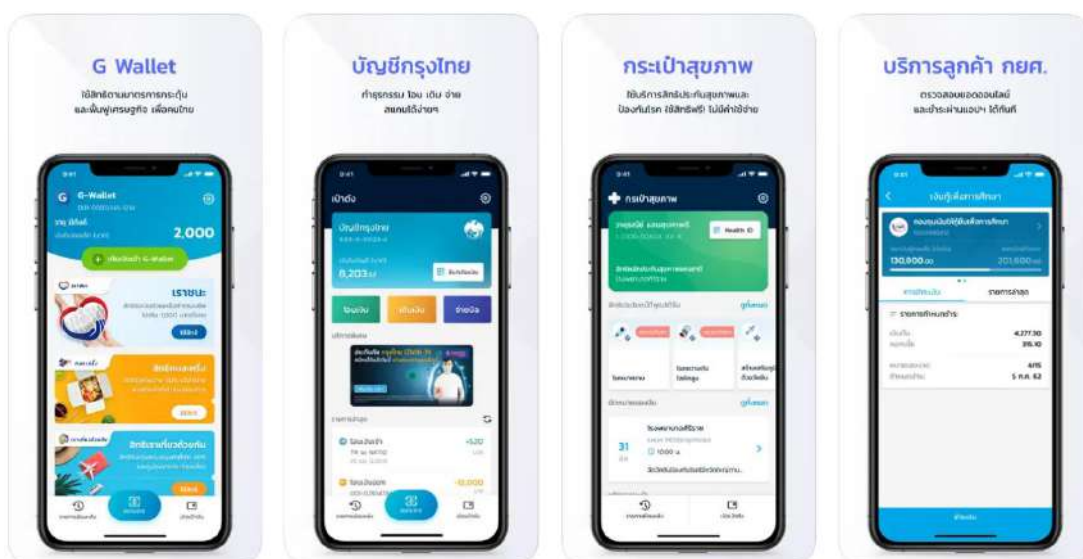


Figure 6.3 Paotang application

Source: [App Store](#) (Fair use)

6.1.4 Data-driven e-business

As discussed earlier in **Section 1.3.2**, digital transformation should begin and end with the customer ([Ayyaswamy et al., 2022](#)). Transforming traditional e-commerce into digital commerce relies on insights that help identify customer needs as well as the customer experience on the platform. Many companies invest in new technology to increase operational efficiencies and reduce costs but struggle with poorly designed customer experiences.

More businesses have realized that their digital transformation strategy must start with the customer experience (CX). They understand that creating a different and competitive experience will attract new customers, keep them engaged, and drive recurring income. The rapid advance of smart technology combined with reduced computing and storage costs makes technologies, especially data analytics and machine learning, obtainable by businesses of any size.

6.2 Launching a New E-business

We all know that selling is the delivery of goods to the buyer and receiving payments. However, businesses need to follow a certain pattern to ensure they are profitable. This section discusses the possible approaches to digital commerce.

6.2.1 Digital commerce business models

Dropshipping

Dropshipping is a sale where the seller does not hold the goods but has entered into an agreement with the supplier in advance to supply the goods upon request. Upon receipt of an order, the seller forwards the order to the supplier to deliver goods to the buyer. The seller receives the full payment, transfers the net amount to the supplier, and retains the difference.

Dropshipping is good for start-ups as sellers don't need to have an inventory or stock products in bulk. They only have to maintain a good relationship with some trusted suppliers. The concept sounds easy, but the competition is so high, especially in leading e-commerce websites like eBay and Amazon. Although the supplier is responsible for packing and shipping, the seller still needs to handle customer service.

Wholesaling & warehousing

Wholesaling and warehousing is one of the basic forms of business where the seller orders large quantities of goods from the supplier and negotiate a wholesale price. The seller stocks all the items in the warehouse and sells them at the retail price. This

method requires a large investment, and the seller must ensure that everything they buy can be sold. Anything that can't be sold will be deducted from the total revenue.

Usually, in this way, the sellers have to pack and ship the products themselves because they keep all the items with them. However, they may also use third-party fulfillment services (described in **Section 6.1.2**) that will help them manage a warehouse, shipping, and inventory.

Private labeling

Private labeling means that the seller designs their own products and manufactures them for distribution under their brands. Businesses may produce goods in bulk or make them to order. Finished goods can be shipped to the warehouse or directly to consumers.

Small businesses may use on-demand manufacturing without investing in construction costs. Instead, they can hire a factory or manufacturer to produce custom products and pay for materials and manufacturing costs.

White labeling

Many people may have seen products with very similar features but different brands. Sometimes consumers may be unable to distinguish a particular brand without a product label. In fact, those products may be from the same manufacturer. There are some manufacturers producing generic products and supplying them to different brands.

White labeling means that businesses employ those manufacturers to produce goods using existing formulas and attach their brand labels. This way, sellers do not need to design their own products, saving a lot of operating costs. However, making a product stand out among other similar brands may require different approaches, such as packaging design.

Subscription

Many digital products, such as e-magazines, video-on-demand, and various online services, use a subscription model. The subscription model also applies to regular e-commerce, which means that members will get their products delivered to their door on a regular basis; Monthly, weekly, or daily. Consumer products that take the subscription model are often those that are recurring and have a predictable lifespan, such as drinking water, toilet paper, and coffee capsules.

Subscription provides relatively stable income, but businesses still have to motivate customers to renew or upgrade. Affiliate marketing could help businesses sustain brand loyalty and reach new customer bases.

6.2.2 How to start an online store?

Recent online tools make it easier to open an online store, even for people with no prior e-commerce experience. The following suggestions are adapted from [Kumar \(2022\)](#).

1) Choose the product – There are many opportunities to find products for sale, whether it's production, retail, or drop shipping. Merchants can go with passion or expertise. Plus, they can see what's hot in online marketing and social media. Google Trends and Twitter Trends, suggested in **Section 4.2.1**, are useful tools for gaining insights into what people are interested in.

2) Choose the target audience – When starting an online store, knowing the target audience is essential as it will be easier to attract potential customers to the store. Merchants can target audiences by defining attributes such as demographics (age, gender, occupation, education, and income) and location (country or GPS coordinates). For example, products for the elderly may have specific marketing channels, and certain items have restrictions on international shipping.

3) Choose the platform – Merchants may choose to place their items on the online marketplace, such as eBay and Shopify, by simply listing the new product and accepting online payments. Also, they can sell on social media or their own website. No matter which channel(s) the seller chooses, it's important to research the terms and sales process as they may vary.

4) Comply with the legal requirements – E-commerce platforms always announce terms of use, including prohibited and regulated items. Some products are restricted in certain countries where e-commerce platforms usually have mechanisms to regulate them. For a merchant-operated website, studying the legal requirements and complying with them is even more necessary. Merchant registration is mandatory in some countries. Even if it is not a requirement, registration might affect the tax calculation.

5) Design a storefront – A merchant-owned website often supports endless imaginative designs. Online marketing and social media are limited in design. There are also materials that merchants need to prepare before listing their products, such as images and descriptions that must meet the platform's guidelines. A distinctive storefront will increase competitiveness, especially on platforms with a large number of competitors.

6) Connect a payment gateway – Well-known e-commerce platforms like eBay, Amazon, Shopify, and Alibaba have integrated payment systems available. The store owner can set the payment to be transferred to the connected PayPal or bank account. The platform may set payouts daily, weekly, or monthly or be customized by the store owner. Domestic sales may include additional accepted local payment methods. Selling on platforms that don't have an integrated payment system, merchants may require less secure methods, such as wire transfers or cash on delivery.

7) Get the store ready for launch – There are a few more steps before the store opens to ensure that it will create a strong first impression and provide a smooth customer experience. Some platforms allow sellers to add custom domain names to their storefronts, making it easier for shoppers to remember and increase their online presence. Some platforms can be linked with other platforms and social media to increase sales channels. In addition, merchants may need to set up notification alerts to be informed immediately when a new order is placed or if there is a contact from a customer.

8) Launch the store – Business operations after launch start with attracting customers to the online store (called customer acquisition). There are various methods, such as posting on social media, blogging, running online ads, and using influencer marketing.

9) Market the store – Follow-up is very important at this stage because it lets merchants know how much each channel can attract audiences and generate revenue. Ad providers, including e-commerce platforms themselves, often have this insight that merchants can review. For more detailed analysis and flexible reporting, merchants can set up [Google Analytics](#) or [Meta Pixel](#) (previously Facebook Pixel) for free.

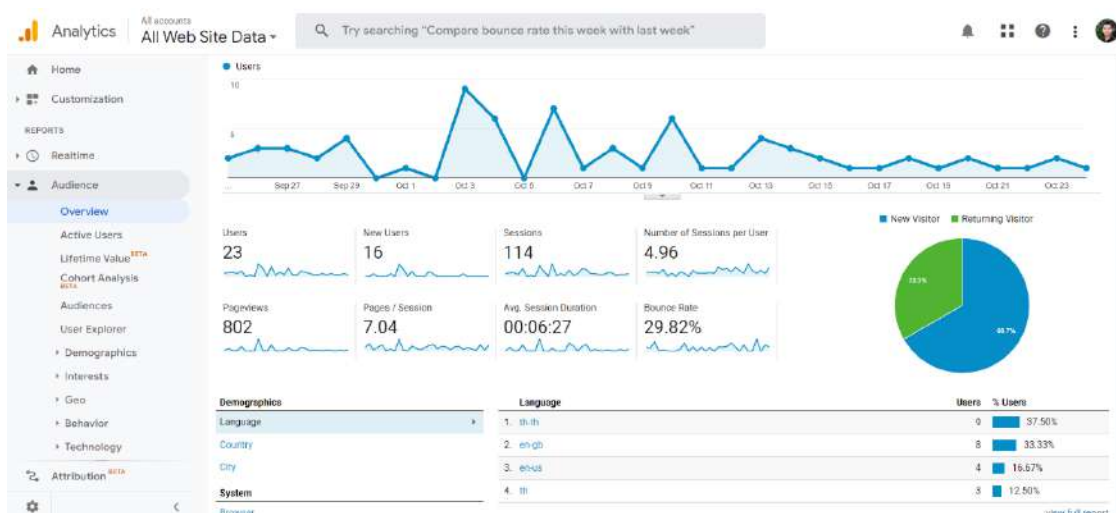


Figure 6.4 Google Analytics

Source: Own screenshot showing [Google Analytics \(Terms\)](#)

6.3 Things to Consider when Buying and Selling Online

Guides on selling and buying online are abundant on the internet. Here we will summarize the key points and give some examples and case studies.

6.3.1 Copyright infringement

Copyright infringement can occur at various stages throughout the trading process. There was an instance where Thai graduate students sold textbooks marketed in Thailand on eBay and bought by US buyers ([Williams, 2013](#)). This is because publishers

set different selling prices for textbooks based on the GDP of the country in which they are marketed. The seller, therefore, profits from this difference. Although the seller wins in court, such trading is seen as a gray business, and it is uncertain whether there will be more strict regulations in the future.

The image displayed on the online storefront is the first thing viewers will see and is the key factor they use in deciding whether to buy from us or any other store that appears next to us in search results. Many stores choose to use official photos from manufacturers, which is considered infringement, and many e-commerce platforms do not allow it. Many people use images from the internet, most of which are copyrighted. Many shops used images owned by other stores and have caused controversy many times.

Product photography requires setup and skills, as shown in **Figure 6.5**. That is why those images are protected by copyright. On the other hand, if merchants know the technique and can take their own product photos, they will be able to create a unique presentation and have the rights to their images.



Figure 6.5 Product photography

Source: [Flickr](#) (CC BY-SA)

Infringement protection is more difficult for digital goods because images, videos, and texts can be easily shared. Even with good protection, there are some screen recording tools that can be used. The sustainable solution is that consumers should refrain from copyright infringement and not support businesses that do so.

6.3.2 Quick responses

Consumers today have a limited tolerance for advertising. If retailers don't reply right away, customers will be free to move on to more accessible stores. Creating an automated trading system, as discussed in **Section 6.1.2**, relieves merchants of much of the concern regarding order response times. It's crucial for retailers who use social media or instant messaging to pay attention to responding.

Whatever system is used, viewers may want to contact the seller to ask for more information before making a purchase. As many online stores are abandoned, viewers may try contacting the seller first to ensure the store stays active. Many platforms provide information on how much the store owner cares about responding. Facebook pages will receive a badge "very responsive to messages" if moderators respond to 90% of customer comments and posts within five minutes (see **Figure 6.6a**). For Twitter, a platform focused on short messages, most users expect an immediate response. Customers usually want a response within an hour of posting ([Social Stamina, 2022](#)).

Everyone knows that a quick reply is essential, but it's almost impossible to respond to every message instantly as the store owner may need some private time. Some customers prefer to shop late at night, and customers in different time zones will have some issues with real-time communication. Some stores may receive a large number of contacts that a single merchant is unable to handle. Many stores have implemented **chatbots** (see **Figure 6.6b**), technology that uses AI to process customer messages and automatically respond based on information provided by merchants. This system works similarly to FAQ, whereby vendors identify answers to questions that are often asked. Chatbots reduce the workload of answering the same questions repeatedly. An effective system can self-learn and make customers feel like they're talking to a real person.

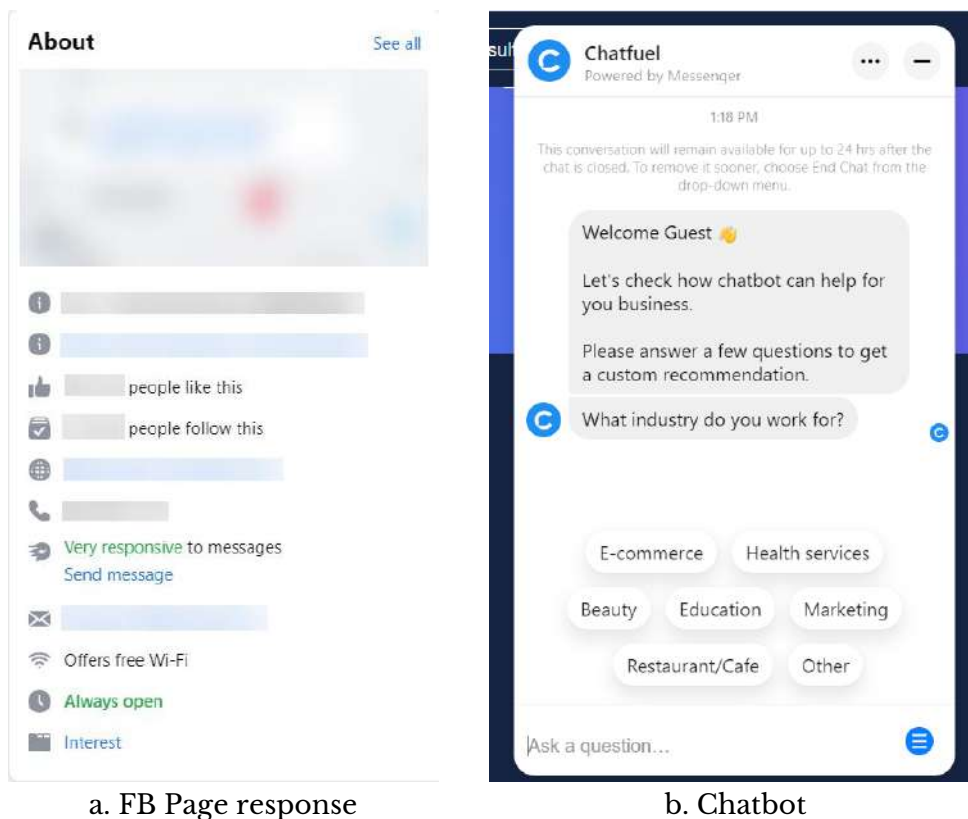


Figure 6.6 FB Page response

Source: Own screenshots showing FB Page and [Chatfuel](#)

6.3.3 Order management

Social media can be an ideal sales channel for inexperienced sellers as the initial sales volume is usually manageable. The business has the opportunity to grow if the merchant manages it well. As the store receives more orders, the merchant may need an assistant at some point. Otherwise, some customers may not get a timely response, which can lead to negative feedback for the business. Once a store is well known, merchants may begin to expand their channels to e-commerce platforms where they can take advantage of automated sales management.

6.3.4 Updates

In addition to the "very responsive" badge in Figure 6.6, many platforms also provide more detailed information, including the last time the store owner logged in and when the store was last updated. From a shopper's point of view, stores that lack owner attention are unreliable. Customers may be unsure whether an item is still for sale or when their messages will be responded to. Merchants should allocate time each day to take care of the store even if there is no system notification. If a merchant manages multiple stores or channels, it may be necessary to set up calendar notifications.

6.3.5 Proofreading

Small errors could occur when communicating with customers via chat, which is normal. However, any media that go public should be proofread. We have mentioned in Sections 1.1.3 and 1.2.3 that advertising or promotional materials that contain misspellings or other errors appear extremely unreliable.

6.3.6 Testimonial

Testimonials are statements made by individuals that describe the good qualities of a product or a good experience after using the service. Celebrity endorsements are often used for promotional and advertising purposes. Testimonials also appear as customer reviews posted on e-commerce or social media platforms. Viewers rely on testimonials to make purchase decisions for products and services they cannot experience before buying.

Consumers may find that many testimonials are false and misleading, influencing poor decisions about a product or service. In some countries, it is illegal to create fake testimonials. Online consumers should consider the testimonials and check the following irregularities ([Hill, 2022](#)).

- 1) The overwhelming five-star reviews can be false positive, and false negatives tend to be one-star reviews.

2) Fake reviews often lack detail. Quality reviews should look authentic and include product photos and/or videos taken by the buyers upon receiving the shipment.

3) Generic reviews like "Very good" or "Good quality" tend to be fake. Such reviews are not helpful, anyway.

4) Fake reviewers often have standard words prepared in advance. Try to notice wording that is formatted and similar to other reviews.

5) Multinational businesses often use translation tools to create fake reviews. You'll notice that some reviews don't look like those written by native speakers.

6) Fake reviews often mention competing products.

7) Fake accounts often have no purchase history or have been created recently. Many platforms allow members to write a review only after they've verified that they've received the item.

8) Fake reviewers are often employed for short periods of time. Try to notice an unusually high number of reviews on any certain date. Try to see if they are from the same IP address, geolocation, or accounts registered at about the same time.

9) On some platforms, users can check which items a reviewer has purchased (may not reveal their identity in accordance with the privacy policy). Reviews from users whose purchases are overly irrelevant may be fake.

Conclusion

Digital commerce is an extension of traditional e-commerce by adding digital goods that are delivered online. Digital commerce develops a more automated and self-service trading process using fulfillment services. Moreover, both buyers and sellers can take advantage of the vast amount of information available to make informed decisions.

Digital commerce businesses may use dropshipping by collecting payments from customers and passing orders to manufacturers or providers. Businesses may take the traditional approach by purchasing large quantities of goods at wholesale prices and gradually bringing them out to retail. Many stores produce unique products for sale or hire a manufacturer to produce generic products and attach their brand labels (called white labeling). Most digital products use subscription sales. The same method is also applicable to consumer products with consistent consumption rates.

Selling online in the digital age can be easily started through social media or conventional e-commerce platforms. The challenge lies in the design of the storefront and the timely response. Testimonials are also important because viewers often don't have a chance to see the real products until they're delivered to their homes. As a buyer, carefully considering the testimonials will help rule out misleading or fake reviews.

Wrap-up Activity

1) Learn the process of selling products through e-commerce and social media platforms from video clips on YouTube or anywhere else. Try to recognize the required information and some tricks suggested by experienced merchants. Please note that students are not required to actually open a store and sell items.

2) Watch some product review videos on YouTube or other video platforms. Try to identify whether the videos are based on real user experiences or sponsored by brands.

3) Assess the credibility of various merchants on the e-commerce platform and prioritize information, such as stars, product reviews, frequency of updates, and the response of merchants.

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Lesson Plan: Chapter 7

1. Topics

- 1) Potential health issues
- 2) Maintaining health and safety
- 3) Digital health

2. Learning objectives

By the end of this chapter, students should be able to:

- 1) Describe the effects of digital technology on physical, mental, and social health.
- 2) Use digital technology appropriately to reduce the impact on health.
- 3) Discuss innovations and digital technologies used in health promotion, such as telemedicine and wearable devices.

3. Teaching methods and learning activities

Introduction

Have a quick question asking about students' screen time per day.

Presentation

- 1) Explain some potential health issues caused by having too much screen time.
- 2) Discuss how much screen time is reasonable for students based on individual needs and how to manage it.
- 3) Illustrate some digital technologies used to promote health.

Conclusion

- 1) Give the lesson summary.
- 2) Students review the lesson from the interactive courseware.
- 3) Students complete the chapter quiz.

4. Teaching materials

- 1) Instructional material: GEN0309 Digital Life
- 2) Presentation (PPTX)
- 3) Courseware (Moodle SCORM)

5. Assessment and evaluation

- 1) Participation in the class, online meeting, live stream, or meeting record
- 2) Participation in the discussions
- 3) Courseware attempts
- 4) Quiz score

Chapter 7

Digital Wellness

The internet, cell phones, and other digital gadgets are necessary for the regular work and activities of digital citizens. While advancing technology helps people, it also removes some aspects of daily living and contributes to numerous illnesses. Digital wellness (also known as digital wellbeing) is about fostering healthy technology habits at work and in personal life and balancing the two through behavior changes and the use of technology. A "Do Not Disturb" function on smartphones that mutes notifications while you're in a meeting or trying to get some sleep is an example of technology that encourages digital wellness. A feature that alerts users when their daily screen time exceeds the recommended limit is also available ([Citrix, 2022](#)). This chapter will introduce healthy digital technology habits and contemporary tools that can support them.

7.1 Potential Health Issues

Careless use of digital technology can negatively impact physical and mental health and possibly affect social relationships.

7.1.1 Physical impact

There are physiological problems caused by the excessive use of computers, internet, and mobile phones, as follows ([Care Spot, 2020](#)):

High blood pressure

According to a study, teenagers who spend at least 14 hours per week online are more likely to develop high blood pressure ([Cassidy-Bushrow et al., 2015](#)). It should be noted that not all internet users display this symptom. Watching stressful material or remaining still for extended periods of time can both cause high blood pressure.

Computer vision syndrome

Computer vision syndrome (CVS), often known as eye strain, is a condition that affects the eyes and vision after using computers, smartphones, or other digital devices for extended periods. Long periods of time spent focusing on a computer or screen can be more stressful on the eyes, especially if the equipment is not set up properly (e.g., too little or too much screen brightness). According to research, those who stare at a computer or digital screen for two or more hours straight each day risk acquiring computer vision syndrome ([American Optometric Association, 2022](#)).

Hearing loss

Many people experience hearing loss caused by repeated exposure to loud noises ([Capritto, 2019](#)). In the old days, this problem often occurred with people who regularly lived in noisy environments, such as construction sites, concerts, and sports events. In the digital age, hearing loss can be found among people who use headphones regularly. Normally people use headphones to listen to music and other entertainment. Sometimes, using headphones is inevitable, such as during online meetings. Many times, users turn up the volume due to external noise or excessive use of headphones, which causes them to feel like the sound is too soft.

Neck and back pain

Many people will always be required to sit in defined areas, particularly near keyboards and computer screens. Long periods of sitting might aggravate the shoulders and cervical spine's surrounding muscles ([Ward, 2022](#)).

Hand and wrist pain

The repetitive motions of texting, typing, and scrolling strain the hands and wrists. This deterioration over time may result in inflammation in joints and tendons, resulting in discomfort, edema, and restricted movement ([Knight, 2020](#)).

The thumb used to navigate through smartphone screens and type text messages are particularly prone to these injuries. Additionally, finger triggers are brought on by intensive and constant mouse clicking or movement, particularly among action game players. Additionally, areas of the hands and arms that must be held in one place for extended periods of time, such as while holding a phone to one's ear, are susceptible to injuries.

Overweight and obesity

The research on the link between heavy internet usage and obesity has generated some debate ([Borne, 2020](#)). However, we can state at the outset that unhealthy lifestyle choices frequently contribute to being overweight or obese. Humans must engage in physical activity to burn part of the calories they consume. Excessive sedentary behaviors, such as using computers for work, playing video games, and surfing the internet, prevent physical activity, which contributes to the buildup of body fat.

7.1.2 Mental and social impact

In addition to having a detrimental impact on physical health, excessive internet and digital gadget use have the following negative impacts on mental health and social relationship:

Problematic internet use

Problematic internet use (also known as internet addiction) is a general phrase that refers to the pattern of extended internet and digital gadget use that exhibits an addiction issue ([Hoeg et al., 2022](#)). There are numerous instances of internet addiction:

1) Content addiction – As mentioned in **Section 4.2.1**, good social media content is attractive and engaging. Many people spend most of their time searching for content to watch. The dangers of content addiction depend on the type and duration of viewing. Content addiction also leads to other physical and mental health problems, such as eye strain and anxiety.

2) Gaming addiction – Gaming addiction is related to online and offline gaming activities that cause problems at work or in life. Office workers who spend too much time playing games can noticeably degrade their productivity. Many people keep playing games, skipping meals, or getting less sleep. Some players spend a lot of money to improve the performance or look of the character. With so many new games released daily, gaming addiction is becoming more widespread and dangerous.

3) Spending addiction – Spending addiction involves paid online activities, such as online shopping, trading stocks or cryptos, online auction, and online gambling. These habits can undermine financial stability and interfere with job duties. Too much money spent or lost can affect a person's life and relationship. With quick and easy access to online casinos and shops, people are at risk of becoming spending addicted.

4) Online relationship addiction – Online relationship addicts ignore and forget about their real-life family and friends as they are so focused on establishing and keeping relationships online. Individuals who engage in online relationships frequently hide their real identities and physical characteristics. Many people have such difficulty forming meaningful connections with others (possibly a symptom of social anxiety disorder) that they rely more and more on online relationships. Addiction to online relationships might result in poor social competence.

Stress and anxiety

1) Anxiety – Too much screen time can increase anxiety from reading negative reviews or stressful news.

2) Depression – Social media overuse can lead to depression in certain people. They get unsatisfied with who they are when they contrast their lives with those of others.

3) Insomnia – Overuse of digital devices can interfere with sleep. This is because the bright light from screens disrupts the secretion of melatonin, a hormone that regulates sleep. Problematic internet users often experience this disorder as a result of surfing social media late at night when they should be sleeping.

7.1.3 Social media diagnostics

Social media diagnostics play an important role in helping people spot physical abnormalities that could be a sign of certain diseases and finding a doctor or specialist who can give advice ([Premji, 2018](#)). However, many people search for symptoms online, seek advice from people on social media, and try self-treatment, such as taking oral medications. These people are often embarrassed about their symptoms and reluctant to consult a doctor or tell someone about their ailment.

Remember that the accuracy of online health information varies depending on the quality of the sources. Additionally, some treatments might not be appropriate for particular patients, and there may be multiple disorders with identical symptoms. A qualified doctor must make the diagnosis and conduct the treatment. Additionally, learning more about a health problem may cause excessive anxiety.

7.2 Maintaining Health and Safety

We now understand that utilizing digital technology, especially prolonged screen time, can cause health issues. However, we can change our unhealthy behaviors if we are aware of how they affect our health. We offer some recommendations in this section.

7.2.1 Ergonomic workspace

The ergonomic design means arranging a workplace, especially computer-based workspaces, to be safe and consistent with the movement of operators. Ergonomic design in the workspace reduces injury and pain and increases productivity and overall satisfaction, whether in the office or at home. [Muller \(2021\)](#) suggests how to properly organize the workspace as follows:

Choose the right chair

Furniture stores often categorize office chairs in separate sections. They are distinct from lavish chairs that display the owner's taste or comfortable seats for relaxing (see **Figure 7.1**). An office chair should have the following features:

- 1) The chair should be of the right height. You should be able to sit with your feet flat on the floor and your thighs roughly parallel to the floor.
- 2) The chair's backrest should be adjustable so the user can tilt and recline it to relieve pressure on their back. The backrest's shape should have a natural curvature to support the lower back.
- 3) The chair should include armrests that support the full length of the forearms.
- 4) Select a material that is breathable and not too rigid.

A good office chair can be expensive, but investing in a quality ergonomic one is worth it.



Figure 7.1 Office chair vs. others

Source: [Freepik](#) (Licensed)

Adjust the desk height

Selecting the right desk height is crucial for everyone who must work at a desk. A desk that is too high will strain the forearms while typing, while a desk that is too low will result in back and shoulder discomfort.

If you sit with your feet flat on the floor, there should be enough area under the table for your legs to fit comfortably. The angle between the forearm and upper arm should be between 90 degrees and 110 degrees while the arm rests on the table or the chair's armrests (see **Figure 7.2**).

Position computer devices properly

1) Monitor – Place the monitor about 18-24 inches (45-60 cm) away or at arm's length (see **Figure 7.2**). Putting it too close can strain your eyes while placing it too far can cause you to lean forward to read what's on the screen. The top edge of the monitor should be at or below eye level. The monitor should be placed at an angle of about 10 to 20 degrees to reduce neck strain. If the monitor position is too high, you must look up, which can cause headaches and neck pain. When placing the monitor on a desk and it is still not the right height, you may use a stand or find something to support the monitor to increase the height.

2) Keyboard and mouse – Place the keyboard at a distance that is within your reach, with your elbows at your sides. The middle position of the keyboard is the letter B, which should be in the center front regardless of the Numpad. Your wrists shouldn't flex while you're typing, and your forearms should be about parallel to the floor. If your workstation is too high, you can adjust the keyboard's height using a keyboard tray or drawer. Choose a mouse that has been rounded in the right position to eliminate unconscious grip and tension on the fingers, leading to nerve pain and eventual injury.

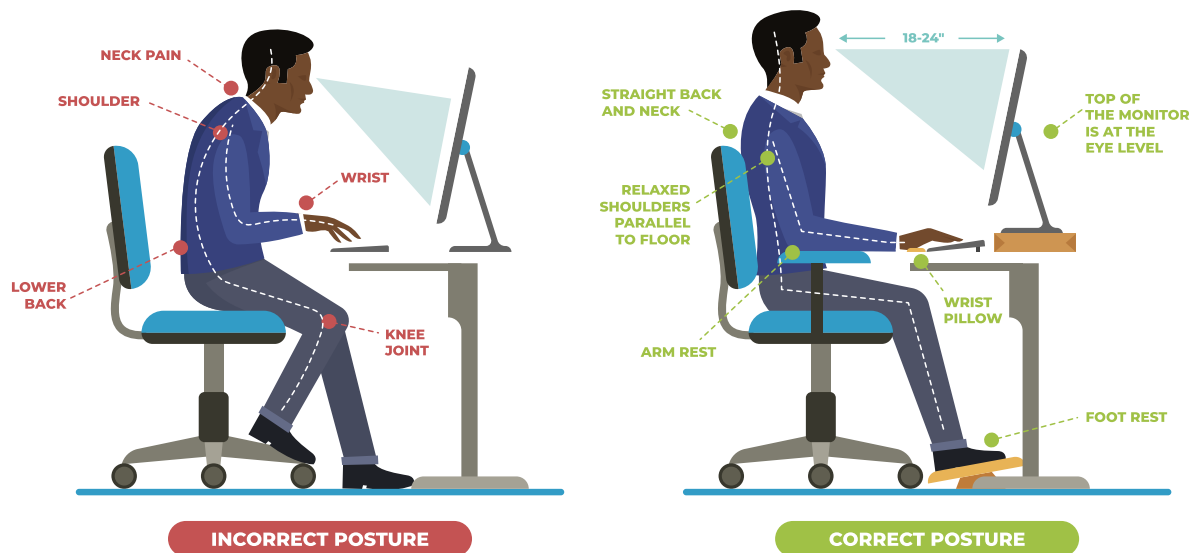


Figure 7.2 Ergonomics at work

Source: [Freepik](#) (Licensed)

3) Laptop – Many people use a laptop for work because it is portable and as versatile as a desktop computer. In order to increase portability, laptops are made with a monitor, keyboard, and mouse all in one piece. A decent ergonomic setup can be difficult to achieve. Placing the monitor at the proper height may cause the keyboard to be too high, while the proper placement of the keyboard may cause the monitor to be too low or too far from the user. If you are working at your desk, you can use a stand to elevate the laptop so that the screen is eye-level and connect the external keyboard and mouse (see Figure 7.3).



Figure 7.3 Laptop stand setup

Sources: [Flickr](#) (CC BY)

4) Dual monitors – The proper setup of dual (two) monitors is crucial to reducing work-related injuries. If the time spent on each monitor is roughly 50/50, position the two monitors as closely as possible. Two monitors should be arranged at an angle to form

a semicircle. When using one monitor more frequently than the other (around 80/20), place the monitor you use more often directly in front of you and place the secondary monitor on one side at an angle that forms a semi-circle. Your dominant eye should be facing the secondary monitor. If possible, use identical monitors with the same resolution so your eyes don't have to adjust the focus so often.



a. Two monitors are used equally



b. Primary and secondary monitors

Figure 7.4 Dual monitor setup

Sources: Flickr [1](#), [2](#) (CC BY)

Organize the workstation

A workstation (an office desk) is where we put things we need on a regular basis to make them easy to find and reach. Unorganized placement of stuff on a workstation increases the risk of accidents or loss of valuable items. Experts recommend dividing a workstation into zones, as shown in **Figure 7.5**, and sorting things by type or order of access during a workday ([Muller, 2021](#)).

1) The first zone is an area easily reached by moving the forearm horizontally. Typically, the keyboard and mouse should be the only items in this space, and nothing else should be present.

2) The next zone can be accessed with arms outstretched but without needing to move the lower body. This is where items like books, notebooks, or stationery go. A water glass or bottle may be positioned in this area, but it must be kept away from other items in case liquid spills and damages them.

3) The third zone is accessible by spreading arms and bending or leaning at the waist without having to stand up. This is an area for things that need occasional adjustments, such as monitors and speakers.

4) Workspaces beyond these zones are for storage purposes only, such as shelves or bookcases. Non-work-related objects should also be outside the work zones.

5) Lighting is also important, both office light and screen brightness. Too dim light makes it difficult for the eyes to focus on the text, while too bright light can cause headaches.

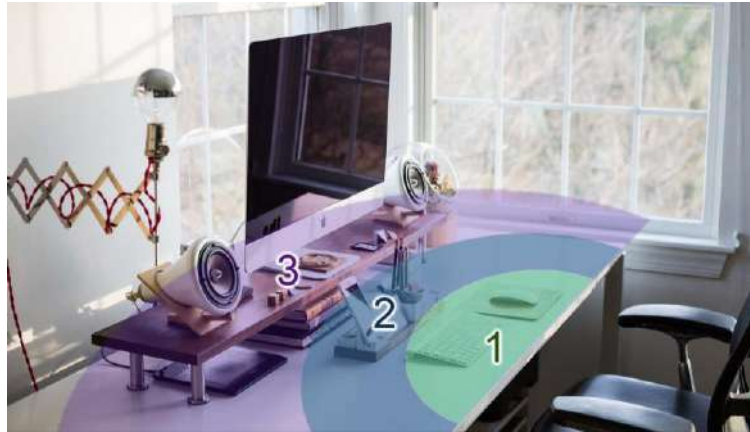


Figure 7.5 Ergonomic workstation setup

Sources: [Pixabay \(Terms\)](#)

7.2.2 Screentime management

Screen time is a serious issue these days. People may spend hours staring at screens, including those on their cellphones, televisions, computers at work and home, or other digital gadgets. Eyestrain can result from prolonged, continuous screen viewing.

20-20-20 rule

The 20-20-20 rule is straightforward: after using a screen for 20 minutes, stare at something 20 feet away for 20 seconds ([Marcin, 2017](#)). It's not necessary to measure 20 feet precisely. You are able to concentrate on distant objects. Try focusing on a distant object outside the window, such as a tree or a building across the street. You may walk outside so that you can rest your eyes.

It takes about 20 seconds for your eyes to completely relax. While you rest your eyes, you should stand up and drink water to keep yourself hydrated. If your body is hydrated, so do your eyes. Today's computers and smartphones have scheduling reminders for when you're spending too much screen time. Additionally, it can alert you after 20 minutes of screen time. Numerous free apps and programs that operate similarly are also available for download.

Eye strain symptoms

The 20-20-20 rule mentioned above is just an introductory guide. Screen users should take a break immediately if they experience any of the following visual disturbances ([Marcin, 2017](#)).

- Dry eyes
- Watery eyes
- Blurred vision
- Doubled vision

- Headaches
- Soreness in the neck, shoulders, or back
- Sensitivity to light
- Trouble concentrating
- Difficulty keeping eyes open

Even if these signs and symptoms most likely indicate eye strain, it's a good idea to inform your doctor of any changes in your vision or eye health.

7.3 Digital Health

The term "digital health" refers to a wide range of medical technologies, including telemedicine, wearable technology for monitoring vital signs, and smartphone applications for tracking exercise and diet. Artificial intelligence and machine learning have completely changed the healthcare industry. A personalized treatment plan can be created using digital health tools, which have the potential to greatly enhance the capacity to accurately identify and treat disease ([Center for Devices and Radiological Health, 2020](#)).

7.3.1 Wearable technology and digital health apps

Wearable technology encompasses all kinds of electronic devices designed to be worn on the user's body and capable of detecting, processing, or communicating ([Yasar & Wigmore, 2022](#)). Smartwatches (see [Figure 7.6](#)) are examples of wearable devices that benefit digital health. Additionally, more sophisticated types of wearable technology are available, such as disposable skin patches equipped with sensors that wirelessly communicate patient data to devices in healthcare settings. Some wearables, such as smartphones and smart tags, work without touching the user.

How wearable technology works

Wearables have smart sensors that track your body's movements. It identifies biometric data such as heart rate or glucose levels and helps with location tracking. It also has a microprocessor and the ability to connect to the internet or Bluetooth so the collected data can be synced with other electronic devices in real-time.



Figure 7.6 Smartwatches

Source: [Freepik](#) (Licensed)

Medical use

The COVID-19 pandemic raised awareness of both personal and public hygiene and prompted people to take precautions to stop the spread of infection. Wearable devices have been developed to alert overcrowded and risky places. Apple's Cardiogram app is another tool for keeping track of heart rate fluctuations in COVID-19 patients.

Sports and exercise

People use wearable technology to track and receive notifications about their heart rate and blood pressure. They can see how many calories they get, which helps them manage training plans.

Wearables can either be integrated into athletic apparel or added to sports equipment like bats and balls. Those devices can connect GPS and Bluetooth and relay real-time data to coaches for analysis via connected electronic devices such as laptops. They are widely used to track player health and performance in a variety of sports.

Digital health empowers consumers to make better-informed decisions about their health and provides new prevention options. Technology can also improve early diagnostic and treatment accessibility for patients in far-off locations.

7.3.2 Telemedicine

Telemedicine is a branch of digital health that includes digitalizing medical records, scheduling remote treatment appointments, self-examination records, etc. Digital and remote clinics can help some patients who cannot travel and save time for patients and doctors. Such counseling is frequently employed in less urgent situations, such as treating COVID-19 in asymptomatic individuals or only exhibiting minor symptoms. Both parties can remain secure while receiving remote treatment that is just as effective as in-person consultations.



Figure 7.7 Telemedicine

Sources: Pixabay [1](#), [2](#) ([Terms](#))

Data management

Telemedicine gives both patients and clinicians access to relevant information at all times to analyze and create better and smarter treatment plans. Data management can be divided into three levels ([El-Miedany, 2017](#)):

1) The electronic medical record (eMR) is a digital version of a medical record in which a patient's clinical data is stored with a provider and can only be retrieved by the provider who owns the data. Sharing information with other service providers may either be printed and mailed or electronically filed via email.

2) The electronic health record (eHR) allows data to be accessed by multiple authorized hospitals and healthcare services. Wherever patients move, even relocating countries or regions, their health records are accessible from a new location.

3) The electronic personal health record (ePHR) is a consumer-focused technology. Patients can access their own medical records, manage chronic diseases, and keep track of their symptoms. They can share their health records with authorized healthcare professionals in a private, safe, and confidential setting. ePHR also allows caregivers to manage health care for other family members, such as children or the elderly.

Challenges

Today's medical technology provides patients with effective access to treatment and self-care. However, technology has several concerns, especially in sensitive issues like health and disease treatment.

1) Configuration – Each person's health information, medical history, and behavior are uniquely varied by nature. To get accurate results, users might have to put in extra work to set up tools or applications as closely as possible to their actual conditions.

2) User interface – Health-related information frequently includes a lot of technical and medical terminology and details that need professional interpretation. Good applications should contain patient-friendly user interfaces and dashboards that offer information to physicians and other healthcare professionals.

3) Privacy – Sensitive information can be found in medical records. Even though it is their own information, having the right to access and share it with others may lead to privacy issues. One significant issue is that the majority of the free apps on the market allow third-party services access to collect personal health data. Before allowing those applications to gain access, it is the client's and the service provider's responsibility to confirm their trustworthiness.

Conclusion

Digital technology makes life and works easier, but excessive use can have negative effects on one's physical and mental health. Computer vision syndrome, high blood pressure, and neck/back pain can result from spending too much screen time combined with poor work conditions, such as inadequate lighting or improper screen placement. By setting up a suitable workplace, these ailments can be avoided. Starting with selecting the appropriate chair and adjusting the desk and chair height as necessary. Your workspace should be organized so that you can sit and work naturally.

Internet addiction, often known as problematic internet use, can occur from excessive online time. Gaming and online shopping addiction can have a negative impact on your financial stability in addition to being harmful to your health. Many people rely too heavily on social media because they struggle to develop relationships. However, using social media excessively can only make it worse and, over time, can have an impact on life skills.

Anyone can find a ton of health-related information on the internet. To make a comprehensive diagnosis, you should utilize it to evaluate the initial symptoms and get medical attention or schedule an appointment with the doctor. Many people look online for medical treatments and then adhere to them, which might be risky.

Today's digital technology can be useful in medicine in the form of wearable devices. Smartwatches have sensors that can track activity and vital signs like the pulse to calculate calorie burn and provide individualized workout plans. Other wearables used by athletes can transmit data to coaches for performance analysis and training program improvement.

Telemedicine increases the chances of people in remote areas accessing treatment. This technology is suitable for simple and non-emergency cases, saving patients and doctors time and lowering the likelihood of disease transmission. Telemedicine depends on exchanging medical and health records among various medical services, which calls for patient consent. With telemedicine, patients have access to their health records wherever they move.

Wrap-up Activity

- 1) Have you ever experienced back pain or eye strain from using your computer or mobile phone? Explore your workspace and the way you use those devices. Find the most likely source of the problem, then look for solutions to improve it.
- 2) How might wearable technology be used for fitness and sports?
- 3) How would you bring your medical records to continue treatment at your destination if you had to relocate? And how can you ensure that sensitive data won't be disclosed to outside parties?

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Lesson Plan: Chapter 8

1. Topics

- 1) Cybersecurity
- 2) Information ethics
- 3) Digital law

2. Learning objectives

By the end of this chapter, students should be able to:

- 1) Recognize potential cyber threats, such as malware, phishing, and hacking.
- 2) Prevent cyber threats with hardware, software, and behavioral change.
- 3) Explain common digital law enforcement in Thailand and globally.
- 4) Use digital technology safely without violating other people's rights.

3. Teaching methods and learning activities

Introduction

Display local and global news showing cyber threats. Ask students if they have ever been in one of those situations and how they responded.

Presentation

- 1) Explain the potential cyber threats and how to deal with them.
- 2) Explain information ethics with some examples of best practices.
- 3) Give examples and explain different digital law enforcement in some countries.

Conclusion

- 1) Give the lesson summary.
- 2) Students review the lesson from the interactive courseware.
- 3) Students complete the chapter quiz.

5. Teaching materials

- 1) Instructional material: GEN0309 Digital Life
- 2) Presentation (PPTX)
- 3) Courseware (Moodle SCORM)

6. Assessment and evaluation

- 1) Participation in the class, online meeting, live stream, or meeting record
- 2) Participation in the discussions and demonstrations
- 3) Courseware attempts
- 4) Quiz score

Chapter 8

Digital Security, Ethics, and Law

Digital technology allows people to access massive amounts of information on the internet and use it anywhere comfortably. Many people say that information uploaded to the internet will stay there forever. That saying is not far from reality. If the information is useful, such technology will bring enormous benefits. For sensitive and personal information such as financial information or health records mentioned in the previous chapter, it can be a terrible idea to make it easily accessible to others. Being able to find information easily also promotes plagiarism behavior. Additionally, many files on the Internet pose a danger that users may not be aware of. This chapter will cover the ethical and safe usage of digital technology and legal obligations for digital citizens.

8.1 Cybersecurity

There are several words that refer to cybersecurity, such as computer security, cyber security, and information technology security (IT security). They are meant to protect computer systems, networks, and personal information from being stolen, counterfeit, or misused.

In order to keep our devices and systems secure, we need to be aware of some potential threats we might encounter in the cyber world. This section introduces various kinds of cyber threats and how to prevent them.

8.1.1 Malware

Malware is software designed to inflict damage on a system or data in some ways. Malware can annoy users or cause permanent device or data loss. Malware is mostly found in executable files, such as EXE (a Windows file used to launch or install programs), and documents containing executable code, such as a Macro-enabled Excel workbook. Malware may pose as common files in an effort to convince users that they are secure. When the malware is executed, a number of harmful features will be activated.

Some kinds of malware have the potential to spread to other systems. The spread of malware is primarily caused by downloading files from sources other than the developers or official stores. Data transmission between devices is another way malware can propagate, particularly when using flash drives or portable hard drives. Windows PC users are often the first targets of malware attacks ([Cook, 2020](#)). Due to the high percentage of users, operating system vulnerabilities found on one device are likely to exist in many other devices running the same OS as well.

Types of malware

Users continue to refer to all kinds of malicious software as a computer "virus," even though it is no longer the most common type of malware nowadays. Malware can be classified as follows:

1) Virus – Computer viruses are among the first known malware in history. As people began to learn to program for early computers, some curious programmers used their skills in a non-inventive manner by creating software that would harm other devices. Computer viruses are a type of infectious malware known to spread like biological viruses.

2) Worm – A worm is a standalone malware that spreads through a network to infect other machines and duplicates itself to fill up space. Its name refers to the worm's reproduction method. A worm is an infectious software that doesn't harm devices or data, but it might be annoying due to the appearance of a fully utilized system and network.

3) Trojan – A trojan is a malicious program that disguises itself as a normal, harmless utility in order to convince victims to install it on their devices. When the malware runs, it opens **backdoors** to allow operators to gain access to the affected computer or install additional software to steal sensitive data. Its name derives from the ancient Greek legend of the Trojan Horse, where Greek warriors hid their armed forces in a gigantic wooden horse. The Trojans thought that the horse was an offering to the gods and brought it into the city. When the townspeople weren't aware, the hidden soldiers came out, opened the gates, and allowed their army to invade. According to various sources ([Briones et al., 2016](#); [Help Net Security, 2018](#); [Cohen, 2020](#)), as of 2020, Trojan is the most common type of malware, accounting for approximately 70% of the total malware in the cyber world.

4) Ransomware – Ransomware is a type of malware that encrypts victims' documents and files or blocks access and demands a ransom to decrypt files. Attackers often demand ransom payments in cryptocurrencies, making it difficult to trace and prosecute the perpetrators. Ransomware attacks frequently use trojans to infect common files or attach links in emails or promotional messages to deceive users into opening them. One instance of the infamous ransomware is the WannaCry, which infected over 200,000 machines across 150 countries, causing billions of USD in damage ([WhoAPI, 2021](#)).

5) Potentially Unwanted Program – There are features that users don't initially want but are forced to install along with other programs. Some programs contain **spyware** that sends certain information on the user's device back to the operators. There is also **adware** that forces the user's computer to display advertisements, which is quite annoying. These features are frequently included in freeware as a way to generate revenue. Users frequently become victims as a result of the careless reading of installation instructions or intentional antivirus deactivation when installing illegal software.

Antivirus

Antivirus software, also known as anti-malware, is a computer program used to prevent, detect, and get rid of the malware. The name "Antivirus" comes from its initial development as virus detection and removal software. Antivirus software began to offer protection against additional computer risks as new malware emerged. Modern antivirus software can protect users from ransomware, keyloggers, backdoors, trojan horses, worms, dialers, fraud tools, adware, and spyware. Some programs also offer defense against spam, phishing, and other online fraud and security risks.

Windows XP users frequently recommended installing the antivirus software as the first program after installing the operating system. Nowadays, the majority of operating systems can handle malware to some extent without the need for additional antivirus programs. Users who find themselves more vulnerable may decide to install additional third-party antivirus software as an alternative, particularly Windows users who inevitably demand external storage devices.

Malware is less likely to infect macOS, Linux, and other operating systems (including mobile OS like Android and iOS). But that doesn't mean non-Windows devices are completely free of malware. Installing antivirus software is still an option to enhance security. Many well-known antivirus software exists, such as Bitdefender, Norton, Kaspersky, ESET, Avast, McAfee, Trend Micro, AVG, Avira, etc. Many of them offer a free or trial version. Keep in mind that antivirus software won't keep you completely safe. Even with antivirus installed, you still need to take care of other security aspects.

8.1.2 Spam and phishing

Spam is a marketing strategy that distributes newsletters or ads to a huge list of recipients via emails or text messages. The most common types of spam are discount coupons, adult content, solicitation of donations, loan offers, and unwanted newsletters. Spam usually has a harmless commercial purpose that just might annoy the recipients.

Businesses should only communicate with customers who have previously expressed interest in a product and have subscribed to the newsletter. However, spammers frequently get a substantial number of email addresses from outside sources. It is relatively simple for email and mobile service providers to detect spam when someone is attempting to send messages in large numbers at once. Most of the spam eventually landed in the "spam" or "junk mail" folder. Your inbox might occasionally contain spam, but you can click to report or completely remove it.

While spam is merely an annoyance, phishing is a targeted attack intended to steal passwords, financial information, and other sensitive data. Phishing frequently imitates

an email sent from a legitimate business, as described in **Section 1.2.3**. You can more easily identify spam by using the following advice.

1) Sender's email address – Look at the sender's email address rather than the sender's name to identify a phishing email. Business emails, including spam, are often sent from business-owned domains (e.g., @apple.com, @twitter.com, and @paypal.com) to enhance credibility. Emails sent from strange domain names are suspected to be phishing (see **Figure 1.10**).

2) Poor writing and errors – We hardly see spelling mistakes in advertising media and communication from well-known companies. They understand that even a small error can significantly impact their reputation. Cyber attackers rarely pay attention to these details, making it easier to detect phishing. However, this does not imply that a well-written email is always secure. Phishing detection must take into account additional factors.

3) Link manipulation– Those with web design skills know that links and the URLs they direct to don't have to match. Try hovering over this link: <https://ssru.ac.th/>. Instead of opening the SSRU homepage as intended, this link takes users to the Facebook page. Attackers use the same principle to spoof links in messages so that it appears as if they direct to the company's website. The best way to prevent this is to not click the link immediately but copy the URL (right-click and select "Save Link As ...") and paste it into a text editor for review.

4) Request sensitive information – Phishing often tricks users into entering passwords or providing other sensitive information, such as personal identification numbers, birthdays, or bank account numbers. Messages containing forms or links to web pages with forms asking for such information are often unsafe.

5) Social engineering – Phishing employs social engineering strategies via forceful communications. Users seem to be under mental stress when asked to carry out tasks like opening attachments, clicking links, or disclosing private information. Most phishing scams emphasize that something must be done quickly, like **"Your account has been locked! Please confirm your password"** or **"You've won \$1 million! Click to claim your prize now."** Attackers may pose as trustworthy individuals or spread false information to provoke anger, leading victims to act irresponsibly.

Don't click on any links that are delivered with messages. For instance, if you receive a notification that your PayPal account has been locked, you can manually browse paypal.com or open your PayPal mobile app to check your account status. If you have been notified that money has been transferred from your bank account, check it on the mobile banking app rather than clicking the attached link. Any email message mentioning a problem related to the service you have never utilized should be ignored.

8.1.3 Hacking

In computing, especially cybersecurity, hacking has a negative meaning that refers to the attempt to gain unauthorized access to another person's computer system in order to get information or carry out the malicious activity ([Cambridge Dictionary, 2022](#)). People who try to penetrate defenses and exploit vulnerabilities in a computer system or network are known as **hackers**. They are sometimes referred to as "**black hat hackers**" if their actions are intended to harm or exploit someone else's resources. On the other hand, white hat hackers use their skills to test and find system vulnerabilities and try to fix them. Many users misunderstand that system malfunctions are all caused by hackers' actions, which is not always true.

Unauthorized access to systems, devices, and data can be caused by a number of factors, as follows:

1) System vulnerability – Hackers are relentlessly trying to find system vulnerabilities. Developers are also doing their best to mitigate such vulnerabilities and improve the system's performance. General users should always update the software and operating system to the latest version.

2) Illegal copies – Software developers generally don't include malicious code in their programs. However, some individuals (usually referred to as crackers, certain types of hackers) attempt to illegally modify the source code to alter specific functionalities, such as bypassing the security check or making the program work without proper registration. As the software has been tampered with, we can't be sure of its security. Many hackers embed trojans or ransomware into these illegal copies and lure victims into downloading and installing them.

3) Weak passwords – Hackers can test out different passwords using specific algorithms until they find the correct one. Typically, these algorithms begin their attempts with well-known phrases like "password," "admin," and "123456." Then, they'll try something related to the owner, such as first name, last name, a first and last name combo, and birth date. If it still doesn't work, they'll try dictionary words. Finally, they will commence a **brute-force** attack in which they will test every possible combination. A four-number-digit password has 10,000 possible combinations. A six-character password containing English lowercase letters, uppercase letters, and numbers has a total of 1,679,616 possible combinations, which will take a bit more time to brute-force. Experts suggest that a password should be at least eight-character long, consisting of uppercases, lowercases, numbers, and symbols (a full set of printable characters). That makes a total of 1.8 Trillion possible combinations ([Boston University, 2022](#)). Some systems implement CAPTCHA or another challenge–response authentication (see **Figure 8.1**) to prevent brute-force attacks. The test is to ensure that the one trying to enter the password is a human, not an automated program or script.

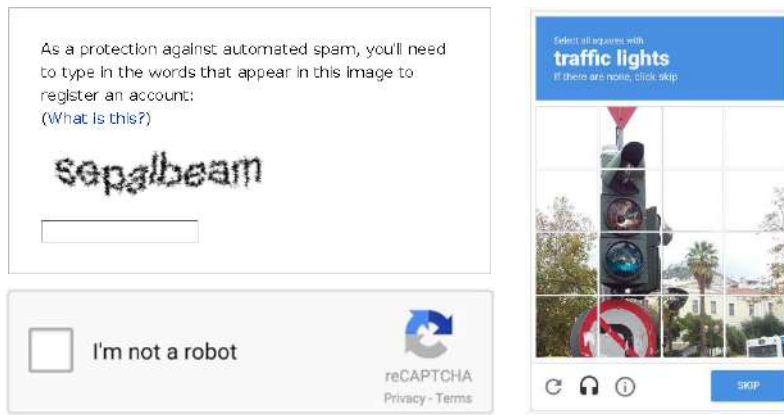


Figure 8.1 Challenge–response authentication

Source: Wikimedia Commons [1](#), [2](#) (CC BY-SA)

4) Excessive consent and permission – Websites, applications, and online services may request access to user information, such as display name, email address, phone number, and contact list. Some services request access to files stored in the cloud drive at the "editing" or "owner" level. **Figure 8.2** displays some safe apps that ask for just the right amount of permissions to function properly. Users should proceed with caution if the app asks for access to data that doesn't seem necessary for it to work, like passwords kept in keychains or the entire contact list.

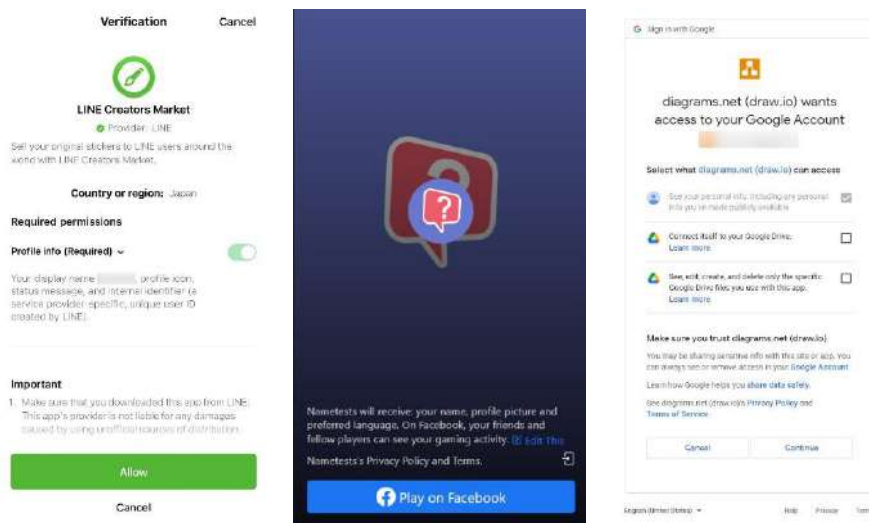


Figure 8.2 User consent and permission

Source: Own screenshots showing [Line Creators Market](#), [Nametests](#), and [diagrams.net](#)

5) Malicious websites – Regardless of the system's effectiveness, unsafe internet usage often causes trouble. Websites that involve gambling, pirated software, pirated movies, or anything illegal are often unsafe. Users are likely to notice that these websites frequently have numerous pop-up advertisements and link spoofing. Dangerous websites often contain malicious code, as well as the software and content they offer.

8.2 Information Ethics

[UNESCO \(2022\)](#) defined information ethics as ethical, legal, and societal aspects of using information and communication technologies. Principles of information ethics are based on the Universal Declaration of Human Rights, which includes freedom of expression, the right to education, the right to privacy, and the right to participate. Promoting the use of technology based on fundamental human rights is the key to equitable social development.

8.2.1 Four ethical issues of the digital age

[Mason \(2017\)](#) raised four ethical issues commonly found in the digital age, known as Mason's PAPA framework, as follows:

Privacy

As previously mentioned, many online services and applications request access to the user's personal data. Many websites have pop-up windows that demand users provide personal information in order to access further information. Internet users need to be more cautious when disclosing personal information to third parties. Nevertheless, users can still leave the page if they choose not to provide any information.

Some web services track users' access without their knowledge. Web cookies save information such as the words entered into the search box, the name of the website the user came from, the order of the visited pages, and other information. Anyone managing a digital business should be aware of how important web cookies are to marketing.

Some invasions of privacy are explicit, like placing a camera to capture a passerby, recording a phone call, or taking a screenshot of a text message without the other party's knowledge. Certain sensitive survey information, such as a history of drug use or sex abuse among the research subjects, may become accessible due to researchers' poor data handling. Even while these actions can have good intentions, such as for security reasons or to gather research data, they can nonetheless be regarded as privacy violations.

Many countries have privacy protection laws, such as the General Data Protection Regulation (GDPR), that are applicable in 27 countries in the European Union (EU) and the European Economic Area (EEA) ([Access Tufts, 2021](#)). In Thailand, there is a Personal Data Protection Act (PDPA). The regulation requires that before processing, collecting, or disclosing personal information, both public and private data controllers and data processors must get the data subject's consent ([Phakdeetham, 2022](#)). Additionally, they have the right to oppose the gathering, using, or disclosing of their personal information. The cookie consent and privacy statement shown in **Figure 8.3** are part of the compliance for both GDPR and PDPA.

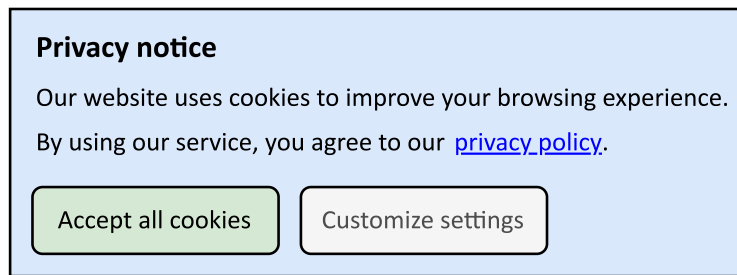


Figure 8.3 Asking for user consent to collect personal data

Source: Own work using diagrams.net

Accuracy

Inaccurate information can be confusing or even deadly to economies and people's lives. It might be in the form of **fake news** that is spread for some reason, either for fun or as part of a business strategy. **Section 1.1.3** provides an example of fake news made for fun. Still, it is not entirely true that such humorous fake news does not inflict any additional damage. The [International Federation of Library Associations and Institutions \(IFLA\) \(2017\)](#) suggested some strategies to spot fake news.

1) Check the source – News information should be traceable to where it came from. Citations of theories or survey results must include verifiable references to documents or articles. You will see that references are incorporated throughout this teaching material. If the source isn't a well-known website or social media profile, it's a good idea to check its background information, such as the type of agency, what expertise it has, and who the authors are. It should be mentioned that certain reputable news organizations have a tendency to be left- or right-leaning, or biased. Also, political or social activists tend to publish news reports or blog entries with bias. Some publishers do not intend to provide useful information at all. They only post jokes or random stories to attract viewers.

2) Read beyond the headlines – Fake news often uses strong and/or misleading headlines to attract viewers, similar to phishing emails mentioned in **Section 8.1.2**. Some people even reply to headlines without reading the details. The frequent use of such deceptive tactics will eventually reduce the publisher's credibility.

3) Check the dates – Some of the news is accurate, but it happened in the distant past. People are frequently shocked by this stuff because they are somehow related to recent occurrences. For example, someone might post the image shown in **Figure 8.4** amidst the coronavirus outbreak in 2020. With Google Images or Google Lens, we clearly see that the image shows Africa's 2014 Ebola virus outbreak.

4) Ask the experts – You might have made an effort to conduct some investigation but were unsure of the accuracy of the information you found. In this situation, you might consider consulting an expert, like a librarian, but make sure neither of you is biased.

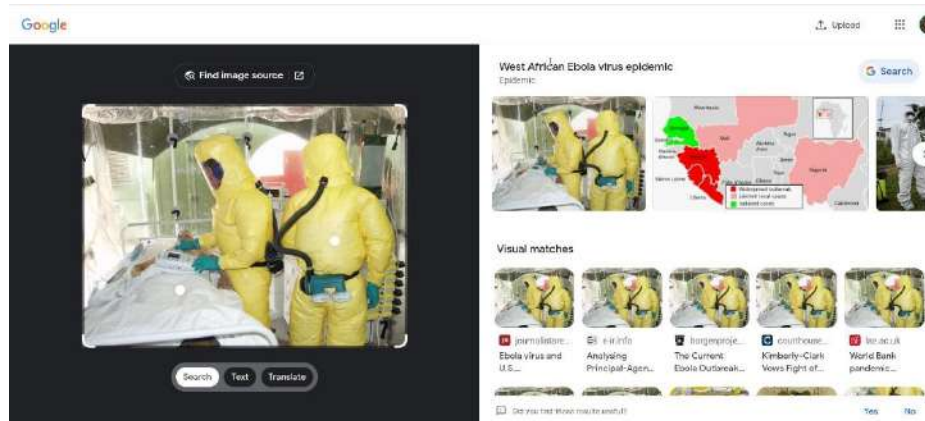


Figure 8.4 Checking the image source using Google Images

Source: Own screenshot showing Google Images ([Terms](#)), contain third-party images (CC BY)

Inaccurate information may be caused by an unstable system, improper data import, or data not being updated, resulting from a sync failure. Imagine your teacher giving you a grade but not appearing on your end. Even worse, your grades may be entered incorrectly into the system by the person in charge of doing so. The same issue can happen to financial transactions. Even one incorrect number can cause great damage to the financial system. Similar to GDPR and PPPA, data-sensitive systems need to define who is responsible for each piece of data, have clear data management standards, and enable user traceability.

Property

As mentioned in **Section 3.3.1**, digital content takes skill and effort to create, but it is easy to copy. Many authors reused portions of previously published works. There are a number of controversies surrounding the ownership of digital media and the extent to which others can use them. Some examples of common controversies include the storytelling of movie content (known as spoilers), the use of images as part of the study, and contractual works. Details on the relevant legislation will be discussed in the next section. However, we can say at the outset that using only self-made works is safer and more rewarding.

Another widely debated issue is the right to use licensed software. Many mentioned equity and necessity, particularly for students who have little income. However, just because something is so expensive doesn't mean you have a right to use it illegally. You can find a free alternative that performs similarly to well-known licensed software if you do some searching. Here are some examples.

- [Pixlr](#), [Fotor](#), and [Photopea](#) are free alternatives to Adobe Photoshop
- [WPS Office](#) and [LibreOffice](#) are free alternatives to Microsoft Office
- [Davinci Resolve](#) and [VideoPad](#) are free alternatives to Adobe Premiere

Accessibility

Part of the ideal data control is allowing relevant users to access and manipulate data according to their rights while preventing unrelated people from reaching the data. Depending on the organization's policies and system management, different users at each level may be granted different permissions to manage data. Possible rights for data management are as follows:

1) View – "View" is the lowest permission level of data handling. Visitors are usually only authorized to view the company's publicly available information but not to get their hands on other internal information. E-magazine and video-on-demand service subscribers are often only entitled to view content.

2) Export – The ability to "export" data means users are allowed to save a copy of the file on their device. In the e-magazine and video-on-demand example above, subscribers can view but not export content to PDF, PNG, MP4, or any other format. Otherwise, it would damage the revenue system. Most journal publishers only allow paid subscribers to save articles as PDFs. Data administrators should be aware of allowing users to export data from the database, as this can lead to large-scale leaks of private information.

3) Add – Being able to post messages, pictures, or videos on social media means that users are allowed to "add" certain information to the system. You'll find that many websites and social media profiles restrict the type of data users can add. Some organizations may encounter problems with users posting a large number of inappropriate photos and therefore revoke that right. Video files are large and will quickly fill in storage space. Therefore, some websites do not allow the uploading of videos or are limited to paying members only.

4) Edit – Many services do not allow users to "edit" information once added because it can confuse the others as to what is the most recent one. Some service providers may require data correction requests to be on record. Social media platforms often display a message stating if the post has been edited.

5) Remove – Chaos might happen if we allow anyone to "remove" the data from the system. Organizations must carefully consider who can do to protect valuable resources. Deleting some data, even by its owner, may destroy important evidence. Some platforms allow deleting posts, but there will have a message indicating that the post has been removed, and admins retain the right to view that information if a dispute arises.

6) Log – Log refers to the system access history. Each log file recorded when each user was logged in and what they did. System administrators can check from the log file to identify the cause when a problem occurs. However, log files are full of sensitive information, such as names and IP addresses. Administrators must ensure that unrelated parties cannot access this information.

8.2.2 Security and privacy tradeoff

Part of the data security measure is surveillance of traffic, including messages, posts, and files, and eliminating threats before they can cause serious damage. However, many say this is a privacy violation as moderators (both human and AI) keep viewing messages and images even if they are set to private and not shared with anyone. This might be necessary because attackers do whatever they can to evade detection, from embedding malware into common files to sending a malicious link through text messages.

Governments often make security and privacy tradeoffs because they have the legal right to do so. It is also their direct duty to maintain national security. However, data supervisors play an important role in controlling access and sharing to ensure that users' personal data is not used for any other purpose.

8.2.3 Censorship

Censorship restricts access to certain types of information or comments that are against the law or terms of use. Moderators may exercise their right to review and screen out what they deem harmful to others or violate the usage policy. Information that is often censored includes profanity, pornography, and cyberbullying.

There are controversial issues about censorship, such as sexism, queer racism, anti-Semitism, and different political views. Muslim countries often censor advertising that includes alcohol and shows women's bodies. Authoritarian countries often limit access to information that could affect the regime. The Code of ethics for censorship may vary from social context but should be based on the fundamental principle of mutual respect and dignity.

8.3 Digital Law

Digital laws are in force and apply to all online activity, including social media posting, downloading software, publishing photos and videos, and making online transactions. Digital laws have different content and requirements in different countries/states. We mentioned in **Section 1.2.2** that any online action is governed by the law of the person's country of residence, the country of destination with which they are transacting, and the country in which the server computer is located.

Laws established by governments apply to everyone within their jurisdiction, both physical and cyberspace borders. No one can commit an offense by claiming to be ignorant of the law. All digital citizens are responsible for learning the applicable digital laws in their home countries and other nations where they communicate, transact, use and share resources.

8.3.1 Intellectual property

Intellectual property is the protection of works generated from ideas. The rights allow creators or rights holders to use, distribute, and profit from those works while preventing others from doing so. The most common types of intellectual property are copyright, trademark, patent, and trade secret. Some countries may have different classifications or names.

Copyright

Copyright is the protection of creative works. There are numerous forms of work that qualify for copyright protection, including the following ([Google Support, 2022](#)):

- Written works, such as books, articles, novels, drama, and musical compositions (lyrics and notes)
- Artworks, such as photographs, paintings, sculptures, posters, vector graphics, animations, and 3D model
- Sound and video recordings, music, movies, and video clips
- Play, choreography, and other stage performance
- Computer software, source code, mobile applications, and video games

Copyright protection applies to both analog and digital media. The protection begins automatically when the work is fixed in a tangible medium without the requirement for work registration, so long as the creator can verify the work's ownership and originality. For instance, a written work is protected by copyright as soon as the author writes a significant amount of it on paper or saves it to a hard drive or cloud drive. The digital photo is copyright protected as soon as the photographer presses the shutter and a photo is saved to the memory card.

The rights owner can do the following, including allowing or prohibiting others from doing the same with such works ([World Intellectual Property Organization, 2016](#)):

- Broadcast or publish the work
- Make and distribute copies of the work
- Reproduce the work in various formats, such as print or audio recordings
- Translate the work into other languages
- Make derivatives of the work, such as editing the photo, making a slideshow from still images, turning a novel into a screenplay

Copyrights typically expire 50 to 100 years after the creator's death, depending on the jurisdiction (e.g., Life + 50 for Thailand, Life + 70 for the United States, and Life + 100 for Mexico). Certain types of work may consider publication and creation dates rather than the author's life. When a work's copyright expires, it goes into the public domain.

There are certain things you might want to comprehend. First off, copyright protects the expression of the idea (what can be fixed in a medium), not the idea itself. This is due to the fact that while different people may have identical ideas, their different expressions and methods of execution will ultimately lead to variations in the end products. For instance, two individuals have photographed the same vantage point at a well-known place. They both ought to be the owners of their own creations, as they each took the images independently.

The criterion of creativity is another controversial subject. According to copyright law, the work must be creative and original. This indicates that the work must show the author's expertise in the relevant subjects and that a high degree of originality was used in its creation ([US Legal, 2022](#)). For instance, when someone copies another person's artwork or performance, it may be considered copyright infringement if there isn't enough originality added to the original work. Cover singing and dancing are frequently considered to be acts of infringement. The reason why reproduced works are still found on the web is likely due to the copyright holder's neglect to pursue legal action.

While it takes a lot of time, talent, and effort to produce creative works, it is quite simple to replicate stuff with techniques that don't require any experience (e.g., copy & paste and screen capture). However, with the aid of AI, the infringement/plagiarism detection system also performs effectively. YouTube Content ID can tell if the newly-uploaded content is not entirely original. Including copyrighted music will suspend your Facebook and YouTube live streams, even if the sound is coming from a distant music player.

Use of copyrighted material requires permission from the owner. You are still **NOT** allowed to reuse copyrighted material in your own work even if the following criteria are met ([Google Support, 2022](#)):

- You gave credit to the author.
- You bought a physical or digital copy.
- You're not making a profit from the content.
- You've seen similar content elsewhere on the internet.
- You recorded copyrighted content using a recording tool.
- You transcribed text from photos, videos, or audio recordings.
- You've stated that "No copyright infringement is intended."

It is occasionally possible to utilize copyrighted materials without infringement. The Creative Commons licenses, as described in **Section 3.3.1**, are good examples. In some countries, including the United States and Thailand, certain uses of copyright-protected works are allowed by the doctrine of "**fair use**." Some other countries have a parallel concept called "**fair dealing**." There are some factors to consider as follows:

- Its utilization is not done for financial gain or to pass off someone else's work as their own. For instance, it might be considered as fair use to utilize an internet illustration to teach students in a class while giving proper credit. Copying an entire page from another book without providing a citation is considered plagiarism.

- The quantity and essence of the content used are appropriate. For example, writing a movie review without revealing the story's climax might be considered fair use.

- Such use does not affect the copyright owner's ability to profit from his original work. Examples of fair use include displaying a cover image of a book, magazine, or movie, as the owner already publishes those images.

Trademark

A trademark is anything that identifies a specific brand and aids consumers in differentiating it from competitive brands. It can be a name, word, phrase, logo, symbol, design, image, auditory mnemonic (brand melody), or a combination of these things. A trademark owner can be any person, business entity, or legal entity. Trademarks may appear on the packaging, labels, advertising materials, shop signs, or on the product itself. Trademarks are an important marketing tool to make it easy for customers to recognize brands. Franchise businesses can also sell trademark rights to affiliated companies.

Trademark law varies from country to country, but there are two types of marks in common. The "®" indicates that the trademark is registered in that country, and the "™" (must be a superscript) means that the brand owner has made unregistered claims to the trademark. This makes the "®" mark a stronger trademark claim than the "™" mark in most cases. Different requirements in some countries are expressed as follows:

- US law requires brands to display the ® symbol on their product labels for registered trademarks. Otherwise, the business will lose certain benefits, such as a claim for a return of profits or a trademark infringement claim ([Denmeyer & Associates, 2019](#)).

- Products in the US can bear the ™ mark, even without a trademark registration.

- In France, brands with registered trademarks are legally protected without the need to display the ® mark on their products.

- In Germany, the ™ mark must be used in association with a registered trademark.

- In Thailand, brands with registered trademarks can either use the ® or ™ mark, while unregistered trademarks can only bear the ™ mark.

For products bearing the ® or ™ mark manufactured somewhere and exported to another country, the brand must comply with the trademark registration of the destination country or face the risk of fines. There may be an additional step in registering a trademark in a foreign country because it is important to verify that it is not similar to other trademarks previously registered in that country.

The protection period for trademarks varies from country to country. In Thailand and Australia, trademarks are protected for ten years from the date of registration, which can be renewed by paying a fee. In the United States, a trademark does not expire after a certain period of time but remains as long as the owner continues to use the trademark. However, every ten years, the owner must provide evidence that the trademark is still in use, such as a photograph of a registered trademarked product on the store shelf.

Patent

Patents protect inventions and product designs, granting the owner the statutory right to sell such products for a limited time in exchange for disseminating information about the invention to the public. Patents play an important role in some industries to maintain a competitive advantage by preventing competitors from producing comparable products. The process of issuing a patent, including its terms, may vary according to national laws and international agreements. The two common types are "utility patent" and "design patent." Some countries may introduce additional patent types, as described below.

1) Utility patent – A utility patent is issued for the invention of the new machine or process. A utility patent is a lengthy, technical document describing a device's operation, method, or system (see **Figure 8.5a**). According to the legal requirement, such explanation must be understandable by professionals in related fields.

2) Design patent – A design patent protects the visible appearance, such as the container's shape, the apparel's design, the decorative pattern, and the external appearance of the mobile phone. Details appearing on a design patent are pictures or drawings without explaining the functionality or how the invention works (see **Figure 8.5b**). In some countries, design patents are recognized as "design rights" and classified as different intellectual property rights.



a. Utility patent

b. Design patent

Figure 8.5 Patent

Source: Own screenshot showing Google Patents 1, 2 (Terms), contain patent information

3) Plant patent – Plant patents are granted for new plant species invented by laboratory procedures that are not sexual reproduction or natural mutation. Plant patents allow owners to monetize newly developed plant varieties and prevent others from taking advantage of them. Many nations are against plant patents because they fear that large investors will take control of the seeds.

4) Chemical patent – Chemical patents, pharmaceutical patents, or drug patents protect chemical or pharmaceutical industry inventions. Companies often apply for patents because formulations can be easily replicated using chemical analysis. The requirements and protections are no different from utility patents, only that the information presented are chemical formulas rather than mechanical drawings or diagrams. Some countries have objected to drug patents because they make specialized drugs expensive and make them inaccessible to patients

5) Provisional patent – Patenting an invention requires a large amount of official documentation. The invention itself is often very detailed and lengthy, as illustrated in **Figure 8.5a**. Some countries allow inventors to submit a small number of unofficial documents to prove that the invention works as described. Once the documents have been filed, that invention is **pending patent**. However, the protection may be lost if the inventor fails to file a utility patent within the specified period.

6) Utility model – Utility models are introduced in many countries for new inventions that do not use sophisticated methods or modern technology. This kind of intellectual property is also known as a "**petty patent**" (Thailand, Indonesia, etc.) or a "**short-term patent**" (Ireland, Netherlands, etc.). The process for applying for a utility model is shorter and takes less time to consider, but the protection is less than a patent.

Trade secret

Trade secrets are a kind of intellectual property, usually in the form of recipes, manufacturing techniques, material processing methods, chemical formulas, technological processes, and so on. Popular examples of trade secrets include the recipe for Coca-Cola, the KFC fried chicken recipe, and the formula for WD-40 penetrating oil.

In the case of a patent, the owner must disclose such information in exchange for protection. For trade secrets, trade entities keep that information secret for economic purposes. Owners do not have to register with government agencies. Protection of trade secrets is done through a non-disclosure agreement, so no person involved or anyone else can disclose or share it with competitors. Trade secrets are protected as long as such information is not made public.

A trade secret is something of legal value, not just a personal secret. The fraudulent and unauthorized use or disclosure of such confidential information is a violation of the protection of trade secrets, which is punishable by law.

8.3.2 Electronic Transactions Act

The Electronic Transactions Act aims to ensure that electronic documents and e-signature are given the same legal value as paper documents and manually signed signatures. This act is based on transactional law, which is a practice related to business finance and trade. The focus areas are often related to contract drafting and intellectual property affairs.

The major detail of the Electronic Transactions Act is making it feasible to demonstrate that the electronically-signed document is real and unaltered along the way and that the owner has acknowledged the signature that appears. E-signature providers adhere to a particular protocol known as Public Key Infrastructure (PKI). A public key and a private key are given to each digital signer. The signer is the only person who has access to the private key, which is maintained in a secure location and never disclosed. Everyone who needs to validate the e-signature will have access to the signer's public key (see **Figure 8.6**).

When the signer electronically signs a document, a cryptographic algorithm will generate data called "hash." That hash is then encrypted using the signer's private key. The encrypted data is the digital signature which marks the document as "digitally-signed." The signature is also marked with the timestamp.

The person who receives the signed document can decrypt the signature using the signer's public key, which should result in an identical hash. If the public key can't decrypt the signature or the hash doesn't match, the signature is invalid, or the document has been tampered with after it was signed.

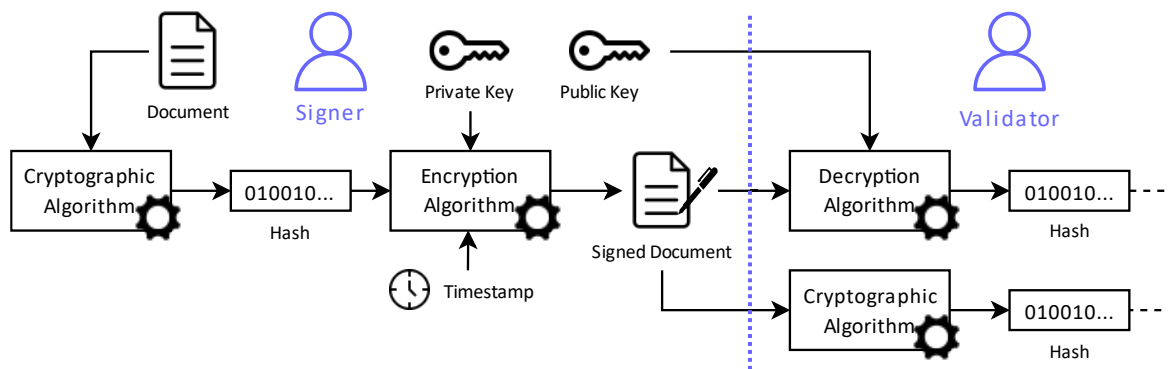


Figure 8.6 How digital signature works?

Source: Own work using diagrams.net

To protect the integrity of the signature, PKI often requires the services of a reliable Certificate Authority (CA), an organization widely recognized for ensuring key security and digital certificates.

8.3.3 Cybercrime law

Cybercrime law includes laws related to computer crime, internet crime, information crime, communication crime, and technological crime ([Michalsons, 2022](#)). The cybercrime law specifies offenses and penalties for cybercriminals, often those who use computers and the internet to attack other computers, data, or communication systems. As digital citizens, we need to understand the cybercrime laws in our own country as well as the countries we communicate with.

Thailand Computer Crime Act of B.E. 2560

Cybercrime law may vary from country to country. Thailand has a Computer Crime Act of B.E. 2560 that is issued to prevent and control potential cybercrime. The [Special Branch Bureau, Royal Thai Police \(2020\)](#) has summarized the key points of the Computer Crime Act as follows:

1) The following actions are considered spam, subject to a maximum of 200,000 baht fine.

- Advertising a shop or business by replying to unrelated social media posts.
- Sending ads via mobile messaging or email without the recipient's consent or without allowing them to unsubscribe.

2) Reacting (e.g., Like) to posts insulting the monarchy is subject to an offense under Section 112.

3) Disseminating information that affects others, including third parties, may be considered an offense under the Computer Crime Act.

4) Do not post or share obscene content.

5) Posts containing photos of children and youth must conceal their faces except when praising or admiring.

6) Providing information about the deceased must not cause defamation or disdain. Relatives can sue the publisher.

7) Posting insults without supporting evidence or using media editing to create fake evidence is punishable by up to three years in prison and a fine of up to 200,000 baht.

8) Never violate copyright, whether it be for writing, music, photographs, or videos, especially if it's for profit. It is permissible to send greetings or hellos using images that are protected by copyright.

9) The administrator can notify the appropriate authority and delete the problematic content if illegal content is discovered on their computer system in case they are not the actual owners of such content. The owner of the website or social media page is not held accountable if the offending material is reported and removed.

Cybercrime law in other countries

Cybercrime laws in some other countries are as follows ([Michalsons, 2022](#)):

- Canada has the Personal Information Protection and Electronic Documents Act of 2000 (PIPEDA)
- China has the Cybersecurity Law of 2016 and the Data Security Law of 2021.
- India has the Information Technology Act of 2000.
- Japan has the Basic Act on Cybersecurity
- The Philippines has the Cybercrime Prevention Act of 2012
- South Africa has the Cybercrimes Act of 2021 and the National Cybersecurity Policy Framework (NCPF)
- The UK has the Computer Misuse Act of 2013
- The United States of America has the Cybersecurity Information Sharing Act (CISA), United States Code, and Framework for Improving Critical Infrastructure Cybersecurity Version 1.1

International cybercrime conventions

Cybercrime is a global issue. Often, the perpetrators were not in the country where the incident occurred, so international coordination was often required to deal with cybercrime. The Budapest Convention is a binding international treaty on cybercrime in which sixty-five countries ratified the Convention, including France, Canada, Japan, the Philippines, South Africa, and the United States. The Budapest Convention provides two frameworks for cybercrime ([Ministry of Justice, New Zealand Government, 2020](#)):

- Pure cybercrime: The use of information and communications technology or the internet to target computers or networks (e.g., creating malware and hacking)
- Cyber-enabled crime: Any criminal act that uses technology or the internet to assist or facilitate, such as fraud, distributing child exploitation materials, and terrorism

The Budapest Convention allows member states to have legal access to evidence as well as to create requirements to secure electronic evidence, making it easier for member countries to collaborate and investigate cybercrime.

The African Union Convention on Cyber Security and Personal Data Protection was drafted in 2011 to create a reliable framework for cybersecurity through the supervision of electronic transactions, protection of personal data, promoting cyber security, and combating cybercrime in Africa ([NATO Cooperative Cyber Defence Centre of Excellence, 2014](#)).

Although cybercrime laws vary from country to country, one common aim is to promote the creative use of computers and the internet without infringing on the rights of others. Everyone's cooperation will help make the online community a great place.

Conclusion

There are many dangers in cyberspace. One thing to be aware of is malware like trojans, ransomware, worms, and viruses. The best protection is to keep the operating system up to date, not modify the OS, and only download programs or apps from official stores. Regularly backing up files, avoiding the use of USB storage devices, and installing an antivirus program also increases security.

Another cyber danger can come through text messages or e-mails with links attached. Users should be aware of suspicious messages, especially those that try to create fear or a sense of urgency, as they could be phishing emails. The sender's email address is the best indicator of phishing emails. Do not click on any links in emails that have unusual domain names.

Attempts to gain unauthorized access to devices, networks, and data (called hacking) often target vulnerabilities such as an outdated operating system and users with weak passwords. In addition, allowing websites, apps, and online services to access more personal data than necessary will open opportunities for scammers to find their way to take control of the system and steal data.

Access, storage, and use of personal data require the owner's consent. Additionally, information should be validated before it is made public, particularly when it concerns security or business, as misinformation can cause panic. Viewers should also be familiar with fundamental data validation techniques. The use of data should not infringe on the intellectual property of others. And data administrators should assign appropriate data management permissions for each group of users.

Part of cybersecurity relies on identifying potential threats in advance and neutralizing them before they cause trouble. Quickly pinpointing the root of the problem can come at the cost of some privacy loss. Some government agencies monitor internet use and censor inappropriate content. Some private agencies may use the same method. The key point is to regulate the use of personal data, especially sensitive information, not to be shared or used for other purposes.

Intellectual property is a digital law that everyone needs to know. Although names and details may vary from country to country, intellectual property often includes copyrights, trademarks, patents, and trade secrets. Copyright protects creative works, such as writings, photographs, music, movies, shows, and computer software. Copyright protection is effective immediately when the work is recorded on the media without the need for registration. Copyrights are protected for the life of the owner and for a period of time after the owner's death.

Trademarks protect brand names, logos, and other things businesses use to distinguish their products from competitors. International traders must carefully review

trademark laws in destination countries. Labeling the product with a registered trademark symbol without completing the trademark registration at the destination country risks fines.

A utility patent protects an invention, such as the machine, method, and production technique, by granting the holder a limited right to profit solely from the invention in exchange for disclosing it. Design patents or design rights protect the external appearance, such as decorative patterns, packaging designs, and user interfaces. Some countries may also designate other types of patents, such as plant and drug patents.

Trade secrets create value for businesses such as Coca-Cola, KFC, and WD-40 recipes. Trade secrets are protected as long as they are not made public. There are legal repercussions for people in charge who attempt to disclose trade secrets and outsiders who attempt to access trade secrets illegally.

Switching to electronic documents instead of paper is part of the digital transformation. Electronic signature verification relies on the Public Key Infrastructure (PKI) protocol to verify whether a document was signed by the right person and whether there was a modification after it was signed.

Cybercrime laws are enforced differently in different countries. Budapest Convention and the African Union Convention on Cyber Security and Personal Data Protection. To communicate or conduct business internationally, one must familiarize oneself with local legal requirements. One common aim of cybercrime laws is to promote the creative use of computers and the internet without infringing on the rights of others.

Wrap-up Activity

- 1) When was the last time you encountered a cyber threat? What was it like? And how did you solve or prevent it?
- 2) Have you ever wished to use or access a particular content on the internet even if you knew you had no right to do so? What was your response?
- 3) Do you think joining an international organization for exchanging cybercrime evidence is good for your country? Explain your reason.

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Appendices

A. Digital literacy evaluation form

Instruction: There are 24 questions. For each question, choose one answer that you think is most appropriate. Some may be more personal opinions than questions with right or wrong answers. Feel free to use a search engine, calculator, or other tools as needed.

1. What equipment do you need to create a local network in a home or small office area?
 - Multifunction printer
 - Digital camera
 - Wireless router
 - Touchscreen monitor

2. Which of the following services allows you to share files online?
 - Google Search
 - Google Drive
 - Google Maps
 - Google Calendar

3. Someone said, "There is no internet here. Use tethering or personal hotspot." What does it mean?
 - You must bring your own Ethernet cable.
 - You must reset the Wi-Fi router.
 - You must ask for permission to use the internet there.
 - You must share the internet from your own smartphone.

4. Who said the following quote?

"Literature suggests that there has been a gap between what is needed by the industry and what was being taught in hospitality schools which to an extent."

 - Anil Bilgihan
 - Donald G. Schoffstall
 - Peter Lugosi
 - Tom Baum

5. What is the search phrase to give you a PowerPoint presentation on global warming?
 - global warming
 - global warming powerpoint
 - global warming filetype: ppt
 - global warming psd

6. Which of the following email addresses should NOT be used for business communications, job applications, and other formal correspondence?

- eliza.k@company.co.sg
- dorothy17@windowslive.com
- jessica_keys@hotmail.com
- fapyourface2007@gmail.com

7. Are online polls more "reliable" than offline polls?

- Online polls are more reliable because they collect responses from a large number of people.
- Online polls are more reliable because online people can respond anonymously, preventing bias.
- Online polls are more reliable because online people often tell the truth.
- It depends on the respondents. The results will be biased if they get responses from a biased group.

8. Select the statement that you agree with the most.

- What we have posted online will remain on the internet forever.
- What people show online reflects what they are in real life.
- We can browse the internet without being detected or traced.
- We don't have to be responsible for what we do online.

9. What should we avoid most when commenting online?

- Suggest or promote our online shop.
- Reply to comments with smiles, stickers, or animated GIFs.
- Comment about other people's ethnicity (gender, skin color, nationality, etc.).
- Express strong disagreement with the post and explain the reason.

10. Is the information from Wikipedia accurate enough to be used as an academic reference?

- Yes, it is accurate enough. Many people refer to this website when writing a report.
- Yes, it is the world-leading online encyclopedia. The information is very accurate.
- Information on this website was created by the community with no reviewing board. Therefore, it should not be used as an academic reference.
- The information is accurate to some extent. However, in terms of academic reference, we should not refer to this website.

11. Your report on plastic waste is currently in progress. These four items were located online. You don't want to dive deeper into technical science. Instead, you want your report to be focused on the environmental impact. Which of the following articles is NOT appropriate for a citation?

- Plastic Recycle**
 H Nishida - Encyclopedia of Polymeric Nanomaterials, 2015 - Springer
 Background Peptide libraries are usually exploited to discover a single or a group of peptides that bind specifically to a target protein and other biological molecules or to target cells in a dish as well as those inside the living body. The selected peptides are potential ...
 ☆ 📄 Related articles All 2 versions
- Reduce, reuse, recycle: Acceptance of CO2-utilization for plastic products**
 J van Heek, K Arning, M Ziefle - Energy Policy, 2017 - Elsevier
 Global warming is a central threat for today's society caused by greenhouse gas emissions, mostly carbon dioxide emissions. Carbon dioxide capture and utilization (CCU) is a promising approach to reduce emissions and the use of expensive and limited fossil ...
 ☆ 📄 Cited by 27 Related articles All 9 versions
- [PDF] Plastic wastes: Reduce, reuse and recycle of plastics are essential to make environment greener and safer**
 PD Sharma - 2015 - sites.google.com
 2 through the distribution of liquid products in more concentrated form. A concern is the proper disposal of waste plastics. Litter results from careless disposal, and decomposition rates in landfills can be extremely long. Consumers should be persuaded or required to ...
 ☆ 📄 Cited by 2 Related articles 📄
- [HTML] How successful are waste abatement campaigns and government policies at reducing plastic waste into the marine environment?**
 K Willis, C Maureaud, C Wilcox, BD Hardesty - Marine Policy, 2018 - Elsevier
 ... plastic recycling programs, Clean Up Australia programs, electronic waste programs, chemical waste programs, 'Love Food, Hate Waste' programs, National Recycling week, general clean-up program, reduce reuse recycle program, plastic bags program, Keep ...
 ☆ 📄 Cited by 30 Related articles All 3 versions

12. Can we rely on an online translation tool like Google Translate or Alibaba Translate?
- Yes, it is convenient, and their translations are very accurate.
 - We can use their services, but we still need to check if they translate correctly.
 - Online translation tools produce some errors, but the A.I. could improve the accuracy.
 - Online translation tools are inaccurate. Human translation is much better.
13. Should we focus on using social media as the only mean of communication?
- Yes, it is highly accessible, and almost everyone uses it.
 - We can use social media, but we must also use other communication channels.
 - We should avoid using social media if we need to convey critical information, such as emotion.
 - Social media makes people lose focus on their actual social life. We should avoid using it at all costs.

14. How do you demonstrate things like beauty make-up, using tools, or using programs to people on the web?

- I prefer creating a text or voice description.
- I'd like to create a tutorial video.
- Creating infographics is my expertise.
- I try not to demonstrate anything on the web.

15. How do you edit videos before posting?

- I usually add some effects using a built-in tool on social media.
- I fully edit my video using a video editing program or app.
- I often upload video footage without any editing.
- I've never published any video.

16. Which of the following pictures best describes what your presentation files look like?

Chance to buy potato chips

Because chips are popular items, there is a high chance that they will be on the same shopping list as beer by coincidence. Beer may not have any influence on making customers want to buy potato chips.

In 2015, Gager B. showed a paper of questionnaire and distributed among students and professionals of WU and PT College collecting the detail consumer buying behavior in purchase of laptop. In the first part of the questionnaire, the consumers were asked whether they had a laptop or not, and those who had a laptop were only considered in the survey. The total of 33 responses were collected, but 45 of the respondents declared that they had a laptop. Furthermore, 7 of the responses were observed since they were considered as reasonable, so as a consequence, 47 of the responses were covered in the study. The results showed that processor speed and type, memory and hard disk capacity, brand name, after-sales service, and display resolution quality are in top five factors which are considered important while purchasing laptop.

In 2016, Ranveer Suresh S Pooja Shrivastava from Aptech Institute of Management Technical Campus, India conducted a survey in 4 cities of Andhra. A sample of Rural and Urban respondents were selected from the districts of Jalandhar, Ludhiana, Patiala and Ferozshah. The survey was carried out on 333 respondents. The data was collected personally and manually. This was used for all the questions concerning customer satisfaction towards various brands of laptop computers and the various factors influencing the purchase decisions. It was found that price was the most significant factor while memory and processor was found the second most significant factor. The study suggested that customers being more aware and educated these days depend on the advanced memory and processor options. Satisfaction is the third most significant factor based on the study. The respondents look for the aesthetic look of the computer, the color of the body among many other features while purchasing a laptop computer. Brand name was found the fourth most significant factor.

In 2017, Ryan Mohan from the Institute of Management, Central University tried to understand in depth the reasons for choosing a particular laptop brand from students. The respondents were 150 students randomly chosen from different 15 institutions. In this study, two main factors have been identified namely that factor is efficiency and performance second factor is model portability. These two factors define the seven features of laptop identified in this research.

Sales Report

Research Population

A research population is a collection of individuals or objects that is the main focus of a research study.

Example 1

The impact of coal mining on the living of people in the Palo community

Qualitative: Interview everyone in the Palo community.

- There are 22 people in this community.
- We will investigate them all.
- We won't interview people outside the Palo community, or the result will be biased.

17. Is it a good idea to have people from different countries work on the same project?

- Yes, because people from different locations will see the problem from different perspectives.
- Yes, so we will have people who specialize in different areas.
- No. There are several obstacles, such as the language barrier and time zones.
- We can do that if travel expenses are supported.

18. Which of the following is NOT required when collaborating online?

- Make sure everyone understands the goal.
- Everyone should have the same knowledge and skills.
- Everyone should have the same right to be a leader.
- Everyone should have the right to voice their opinions.

19. When you want all team members to edit and contribute to the report document, what would you do?

- Have individual members work on their files and have one person collect them.
- Have one person finish the first part and pass it on to the next person.
- Save the document in the cloud drive and allow team members to edit it.
- Have only one person work to avoid confusion, even if it's group work.

20. Four online shops on eBay offer the same product as follows. If you want to order a product and have it shipped to Thailand, which shop should you buy from?

Remax K01 Portable Wired Microphone Single Sing Song Karaoke Mini AUX Speaker
Brand New

THB183.89 to THB188.51
List price: THB377.01
Buy It Now
Free International Shipping
51% off

Top Rated Seller
From China
More colors

Condition: **New**
Sale ends in: **13h 34m 47s**
color: - Select -
Quantity: 1 More than 10 available / 4 sold

Was: AU \$9.43
You save: AU \$0.66 (7% off)
Price: **AU \$8.77**
Approximately THB183.89

Buy It Now
Add to cart
Add to Watchlist

Shipping: **FREE International Economy** : tracked-no signature (11 to 35 business days) | See details
International items may be subject to customs processing and additional charges.
Item location: Shenzhen, China
Ships to: Worldwide | See exclusions

Delivery: **Estimated between Mon. Jan. 20 and Mon. Feb. 24**
Seller ships within 2 days after receiving cleared payment.

Payments:

Returns: 30 days, buyer pays return shipping | See details

Longtime Member
Free Shipping

Seller information: (510200) 98.5% Positive feedback

Remax K01 Portable Mini Microphone Single Sing Song Karaoke Mini AUX Speaker
Brand New

THB222.38 List price: THB259.54
Buy It Now
Free International Shipping
13% off

Top Rated Seller
From China
More colors

Condition: **New**
color: Gold
Quantity: 1 Last one / 3 sold

List price: US \$8.66
You save: US \$1.14 (13% off)
Now: **US \$7.42**
Approximately THB222.38

Buy It Now
Add to cart
Add to Watchlist

Shipping: **FREE Economy International Shipping** | See details
International items may be subject to customs processing and additional charges.
Item location: Shenzhen, China
Ships to: Worldwide | See exclusions

Delivery: **Estimated between Wed. Jan. 22 and Fri. Jan. 31**
Seller ships within 2 days after receiving cleared payment.

Payments:

Returns: 30 day returns. Buyer pays for return shipping | See details

Longtime Member

Seller information: (112363) 97.9% Positive feedback

Mini micro microphone karaoke sing song rmk-k01 brand remax
Brand New

THB500.29
Buy It Now

Top Rated Seller
From France

Seller information
(9316 ★)
99.4% Positive feedback

Condition: **New**
couleur:

Quantity: 3 available

Price: **EUR 14.90**
Approximately
THB500.29

Buy It Now

Add to cart






[Add to Watchlist](#)

Longtime Member

Shop #3

Shipping: May not ship to Thailand - Read item description or contact seller for shipping options. | [See details](#)
Item location: villeneuve la garonne, Île-de-France, France
Ships to: France

Delivery: Varies

Payments:     

Returns: 30 days, buyer pays return shipping | [See details](#)

○

Remax RMK-K01 Mini Microphone 3.5MM Audio Cable Sing Song Karaoke Mini AUX Speak
Brand New

THB314.52
Buy It Now
3+ Watching

From Australia
More colors

Seller information
(661 ★)
98.5% Positive feedback

Condition: **New**
color:

Quantity: 3 available

Price: **AU \$15.00**
Approximately
THB314.52

Buy It Now

Add to cart






[Add to Watchlist](#)

Longtime Member

Shop #4

Shipping: May not ship to Thailand - Read item description or contact seller for shipping options. | [See details](#)
Item location: Bateau Hill, New South Wales, Australia
Ships to: Australia

Delivery: Varies

Payments:     

Returns: Seller does not accept returns | [See details](#)

○

21. The options below list the retail costs of liquid detergent at an online retailer. All of them share the exact same brand and formula. The only variations are in the packaging and marketing. Assuming that you require at least 450ml but no more than 1000ml, all of these options offer free shipping. Which one is your best option?

- (4+2) 75ml refill bags, 180 THB per bag, buy 2 get 1 free
- (2+2) 150ml refill bags, 350 THB per bag, buy 1 get 1 free
- A pack of 3×150ml, 1,000 THB
- A 1-liter gallon, 1,200 THB

22. Check out four e-mails below. Which one is a "real" e-mail that really needs attention?

Microsoft account team <account-security-noreply@account-protection.microsoft.com>
w 11/12/2019 3:45
qnu

Microsoft account

Verify your account

We detected something unusual about a recent sign-in for the Microsoft account [redacted] For example, you might be signing in from a new location, device, or app.

To help keep you safe, we've blocked access to your inbox, contacts list, and calendar for that sign-in. Please review your recent activity and we'll help you secure your account. To regain access, you'll need to confirm that the recent activity was yours.

[Review recent activity](#)

Thanks,
The Microsoft account team

○

Apple ID <q0jldpf9ggk@datamailoposiler.info>
w 6/12/2019 0:00
customer@apple.com; customer@icloud.com; customer@apple.com; customer@icloud.com

Apple ID Locked

Your Apple ID has been Locked for security reasons. December, 5 2019 PST , To unlock it, you must verify your identity.

You cannot access your account and any Apple Services, Before completing verification, and you have to completing verification before 12 hours or your account will be permanently Locked.

[Unlock Account](#)

○

account-alert@amazon.com <devadmin@getglobalgroup.com>
Wed 12/25/2019 5:54 AM
You

Hello,

We believe that an unauthorized party may have accessed your account. To protect your information, we have:

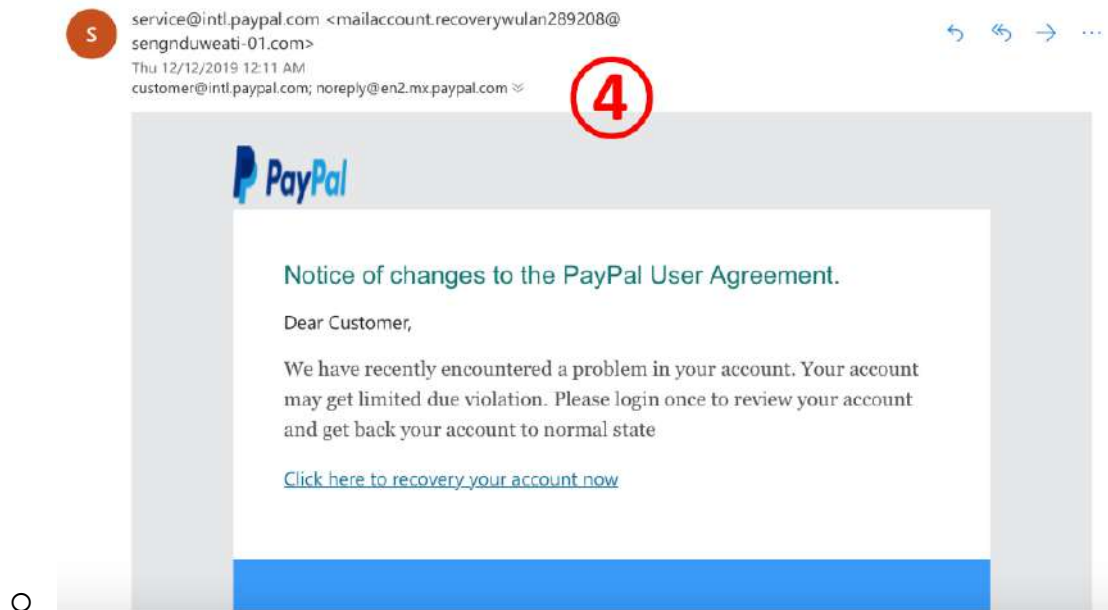
- Disabled the password to your account.
- Reversed any modifications made by this party.
- Canceled any pending orders. You can ignore any confirmation emails that you received for these orders.
- If appropriate, refunded purchases to your payment instrument. However, we recommend you to review all recent activity on your payment methods and report any unauthorized charges to your financial institution.
- Restored any gift card balance that may have been used. It may take 2 to 3 days for the gift card balance to be available in your account.

Follow the instructions, we recommend adding it by clicking :

<https://www.amazon.com/gp/help/customer/display>

In the meantime, we recommend that you also change your email provider's password and passwords for other websites to help protect your account from being compromised again.

○



23. You received an e-mail saying you won a prize or a chance to win big money. What will you do?

- Click to get it immediately. It's yours.
- Just ignore or delete it.
- Review whether you have previously participated in such activities or not. And use extreme caution.
- Forward the email to others in case someone is interested.

24. You find a website where you can watch many recent movies now showing in the cinema. There is a lot of annoying advertisement. But at least it's free and convenient. Will you watch a movie from that website?

- Yes, it's free anyway.
- No, it looks dangerous.
- It's a bad idea. I always watch movies in the cinema or from authorized services.
- Just a few movies are OK. No one will know.

--Respond to these questions in the LMS to get your result.--

B. Social media usage questionnaire

Instruction: This questionnaire was made as part of the Digital Life course at Suan Sunandha Rajabhat University. The aim is to explore the social media usage behavior of undergraduate students attending this course and concerns regarding social media use. The student's answers will not affect their grades, and the teacher will only present the overall result. Please answer this questionnaire truthfully for the benefit of the research.

Part 1: Personal information

Gender

- Female
- Male
- Prefer not to say

Have you attended this course before?

- No, this is my first time attending this course.
- Yes, I attended this course before.

Part 2: Social media usage behavior

Approximately how many hours a day do you use social media platforms?

- I don't use any social media platform. **(Skip this questionnaire)**
- Less than an hour
- 1-3 hours
- 4-6 hours
- 7-9 hours
- 10+ hours

Which of the following platforms have you used at least once in the past 30 days?

Select all that apply.

- | | | |
|---|--|---------------------------------------|
| <input type="checkbox"/> Facebook | <input type="checkbox"/> Snapchat | <input type="checkbox"/> VK |
| <input type="checkbox"/> YouTube | <input type="checkbox"/> Kwai/Kuaishou | <input type="checkbox"/> Reddit |
| <input type="checkbox"/> WhatsApp | <input type="checkbox"/> Sina Weibo | <input type="checkbox"/> LinkedIn |
| <input type="checkbox"/> Instagram | <input type="checkbox"/> QQ | <input type="checkbox"/> Line |
| <input type="checkbox"/> WeChat/Weixin | <input type="checkbox"/> Telegram | <input type="checkbox"/> Other: |
| <input type="checkbox"/> TikTok/Daoyin | <input type="checkbox"/> Twitter | |
| <input type="checkbox"/> (FB) Messenger | <input type="checkbox"/> Pinterest | |

For what purposes do you use social media?

Select all that apply.

- Communicate with people
- Search information
- Post useful information
- Perceive news and updates
- Post news and updates
- Browse photos
- Post photos
- Play games
- Watch videos
- Post videos
- Listen to music
- Shop online
- Sell online
- Reply to customers/clients
- Recruit employees
- Other:

Part 3: Concerns about using social media

Please indicate the level of opinion you have on the following issues.

Issue	Level of agreement				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Social media makes me feel dissatisfied with my life compared to others.					
Social media makes me feel lonely.					
I experienced many bad incidents on social media, such as cyberbullying.					
Social media usage affects my physical health, such as eyestrain and obesity.					
Social media usage affects my mental health, such as stress and sleep problem.					
Social media has a lot of inappropriate content, such as porn and harmful tricks.					
I feel tracked and have no privacy on social media.					
When I use social media, I feel like a big company is using me as a business tool.					
I feel that information on social media is unreliable.					

--Respond to these questions in the LMS to see the overall result.--

C. Online shopping questionnaire

Instruction: This questionnaire was made as part of the Digital Life course at Suan Sunandha Rajabhat University. The aim is to explore the online shopping behavior of undergraduate students attending this course and the problem regarding online shopping. The student's answers will not affect their grades, and the teacher will only present the overall result. Please answer this questionnaire truthfully for the benefit of the research.

Part 1: Personal information

Gender

- Female
- Male
- Prefer not to say

Have you attended this course before?

- No, this is my first time attending this course.
- Yes, I attended this course before.

Part 2: Online shopping behavior

How often do you shop online?

Food delivery platforms and digital products are included.

- Almost every day
- Several times a week
- Several times a month
- Several times a year
- Never (Skip this questionnaire)

What types of products do you typically buy online?

Select all that apply.

- | | |
|---|--|
| <input type="checkbox"/> Freshly cooked food & drinks | <input type="checkbox"/> Furniture and décor |
| <input type="checkbox"/> Packaged food & beverage | <input type="checkbox"/> Household appliances |
| <input type="checkbox"/> Clothing and accessories | <input type="checkbox"/> Household consumer goods |
| <input type="checkbox"/> Cosmetics | <input type="checkbox"/> Stationary |
| <input type="checkbox"/> Healthcare | <input type="checkbox"/> Toys and baby products |
| <input type="checkbox"/> Pet care | <input type="checkbox"/> Books and magazines (hard copies) |
| <input type="checkbox"/> Sports and outdoors | <input type="checkbox"/> Digital goods & subscriptions |
| <input type="checkbox"/> Computer hardware & gadgets | <input type="checkbox"/> Other online services |

How much would you like to spend on a single online purchase?

- Less than 100 THB / 3 USD / 20 RMB
- 101 – 1,000 THB
- 1,001 – 5,000 THB
- 5,001 – 10,000 THB
- More than 10,000 THB

How much is the most expensive item you've ever bought online?

- Less than 100 THB / 3 USD / 20 RMB
- 101 – 1,000 THB
- 1,001 – 5,000 THB
- 5,001 – 10,000 THB
- More than 10,000 THB

From which of the following platforms do you shop online?

Select all that apply.

- In-house food delivery platform (e.g., McDonald's, KFC, 1112)
- Third-party food delivery platform (e.g., Grab Food, Uber Eats, Line Man)
- E-commerce websites owned by the brands (e.g., IKEA, The Mall, H&M)
- Online marketplace (e.g., eBay, Amazon, Alibaba, Shopee, Lazada)
- Social media & livestreams (e.g., Facebook, Instagram, Kwai)
- Digital content publishers (e.g., Netflix, IQ, Steam, Meb, Elsevier)
- Other online services (e.g., Google Cloud, Grammarly, Shutterstock)
- Other:

What is your preferred payment method when shopping online?

Select all that apply.

- Cash on delivery (COD)
- Credit/Debit card
- E-wallet
- Money transfer & Scan to pay
- Cryptocurrency
- Other:

Part 3: Problems regarding online shopping

Have you ever encountered any of the following problems when you shop online?

Select all that apply.

- Website is not mobile-responsive
- Search function does not work properly
- Missing product information
- Hidden charges
- Complex checkout process
- Lack of payment option
- Payment failure
- Security issue
- Delivery problem
- Product quality lower than expected
- Difficult to refund
- Lack of customer support
- Other:

--Respond to these questions in the LMS to see the overall result.--

D. Author's profile



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WORK EXPERIENCE

- Present:** Full-time Lecturer, College of Hospitality Industry Management, Suan Sunandha Rajabhat University
- 2019-2020:** Full-time Lecturer, International College, Suan Sunandha Rajabhat University
- 2007-2018:** Part-time Lecturer, International College, Suan Sunandha Rajabhat University
- 2007-2011:** Full-time Lecturer, Faculty of Industrial Technology, Suan Sunandha Rajabhat University

EDUCATION

- 2020** Ph.D. (Learning Innovation and Technology), King Mongkut's University of Technology Thonburi
- 2007** M.Eng. (Control Engineering), King Mongkut's Institute of Technology Ladkrabang
- 2004** B.Eng. (Mechatronics Engineering), King Mongkut's Institute of Technology Ladkrabang

AREA OF EXPERTISE

- Educational technology
- Hybrid online learning
- LMS and MOOC

RESEARCH AND PUBLICATIONS

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