10

SELF-LEARNING PACKAGE IN

ICT 10

Quarter 2| Week 4-5

Stages of Image Production

Learning Competency:

Identify the stages of image production.

MARICAR R. PORNEL, *Oton NHS*
ZALDY M. TONDO, *Division Science Coordinator*
WRITERS

Ready to Launch!

Electronic photography is the production, viewing, or reproducing of photographic images by electronic means. Today it is possible to produce photographs entirely electronically, without the use of traditional silver-based photographic materials. The method used for the electronic production of higher quality images is to convert them to digital (numerical) form, so the electronic imaging process is often called digital imaging.

Understanding digital image structure, its file size and format, the techniques and the means on how to enhance the images , and the ways on how to distribute these images electronically are the topics you will learn as we discuss the different stages of image production.

Aim at the Target!

At the end of this module you are expected to:

1. *Explain the stages of image production.*

Try This!

Activity 1. Direction. Unscramble the following words with the help of the given

WORD	CLUE
1. IELF EZIS	It is the measure of space a *file* takes up on a storage medium such as a computer hard drive.
2. ROPC	Removes unwanted outer areas from a photographic or illustrated image
3. NOITULOSER	The combination of total number of pixels available in an image and the size at which it is output results in a specific number of pixels.
4. RETNIRP	A device for printing text or pictures onto paper.
5. PPHOHOOTS	It is a digital editing software used to enhance images.

Keep This in Mind!

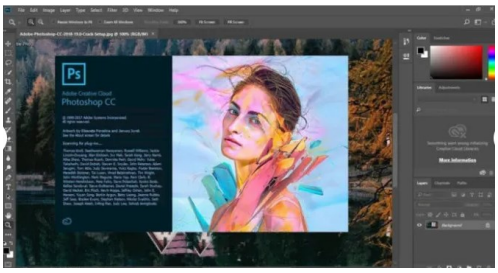
Image production consist of creating, storing , editing and outputting the image. Doing these tasks will involve knowing what are the specific devices and image editing software to be used. Such devices and editing software are use to capture, store, output , and enhance the image.

Activity 2. Match a picture

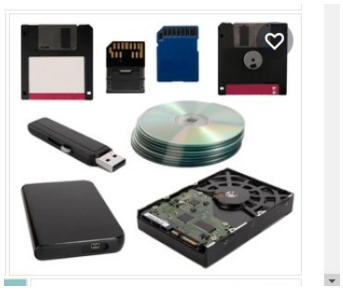
Direction. Match each picture to the following tasks enumerated inside the box. **Write the letter only.**

A. Creating the image	C. Editing the image
B. Storing the image	D. Output the image

1.



3.



2.

4.

5.

Abstraction and Generalization

Stages of image production

1. creating the image
2. storing the image
3. editing (modifying or correcting) the image
4. outputting the image.

1. CREATING THE IMAGE

- There are two methods for creating digital images: (1) original digital images can be created with a digital (filmless) camera, and (2) photographs created using traditional materials and equipment can be converted to digital form with scanners.
- The methods used for creating an electronic image are a derivation from the concepts used in **half-tone printing.** Printing devices that use ink can technically only create two tones—**ink or no ink.**

- They are incapable of providing the continuous shades that a photograph contains. To simulate these shades of gray, the half-tone process converts the photograph to a **grid-work of dots**.
- The dots vary in size, with ***large dots used to represent darker tones,*** **and** ***smaller dots used to represent progressively lighter tones***. If the spacing of the grid is fine enough, the eye blends the dots into intermediate tones. ***The more dots that appear per inch, the finer the quality of the image appears to the eye*****.**
- Color can be reproduced in dot-based images by providing three dots that represent the amounts of the additive primary colors (red, green, and blue, indicated as RGB) or subtractive primary colors (cyan, magenta, and yellow usually used with black as well, indicated as CMYK).

DIGITAL IMAGE STRUCTURE

A similar dot technique is used for creating digital images. In a digital camera, the optical image formed by the lens falls on a solid-state electronic "chip" that contains a grid of light-sensitive elements, usually charge-coupled devices (CCDs). Each element, called a picture element or pixel for short, can measure the illuminance ("brightness") and the percentage of the additive colors of the light falling on it. This information is recorded as numbers. Each pixel has several numbers associated with it:

1. Its position in the grid. This requires two numbers, one each for its **horizontal and vertical positions.**
2. Three numbers that describe the amount of red, blue, and green light falling on that pixel.

Half tone Dots

Resolution. The quality of a digital image depends on how many pixels it contains and the size at which it is reproduced. The combination of total number of pixels available in an image and the size at which it is output results in a specific number of pixels appearing per inch **(ppi)** or centimeter, known as the **resolution**. The higher the resolution of an image (i.e., the more pixels appearing per inch), the better the image can reproduce detail.

Digital Image Magnified enough to see individual pixels

PIXEL to print conversion table

Inches	Pixels
3 x 5	900 x 1500
4 x 6	1200 x 1800
5 x 7	1500 x 2100
8 x 8	2400 x 2400
8 x 10	2400 x 3000
8.5 x 11	2550 x 3300
9 x 16	2700 x 4800
11 x 14	3300 x 4200
11 x 16	3300 x 4800

Image Size in Pixels. The dimensions of the image in pixels are a major consideration when choosing a method of creating digital images. optimum quality. For example, many good-quality magazines print at 150 lines per inch, so the digital image must have a resolution of 300 pixels per inch. That means an image that is 600 x 900 pixels would print at only 2 x 3 inches. In order to print at 8 x 10-inch size, the image must contain 2400 x 3000 pixels.

2. STORING DIGITAL IMAGES

Decisions about how to store (save) your digital images are governed by the size of the data files, the speed with which you can record and read the data.

File Size. File size depends on the number of pixels in the image, the color mode grayscale (monochrome), RGB color, or CMYK color—of the image, and its bit depth (***see Glossary, about bit depth***). The position of each pixel in the image grid is indicated by its position in the data file, so no numbers are required for its coordinates. If the image is grayscale (8-bit monochrome), one 8-bit number (one byte) is needed to describe the tonal value of each pixel. For example, an image that is 400 x 600 pixels contains 240,000 pixels. The data needed for a grayscale image is:

240,000 pixels x 1 byte/pixel = 240,000 bytes = 240 kilobytes.

If the image is in 24-bit RGB color, then three 8-bit binary numbers are needed for each pixel (one each for red, blue, and green) to record its tonal information. The 400 x 600 pixel images would then require:

240,000 pixels x 3 bytes/pixel = 720,000 bytes = 720 kilobytes

Larger output or higher resolution requires a greater number of pixels. An 8 x 10 -inch 24 bit RGB image at a resolution of 300 pixels per inch would need 2400 x 3000 pixels, with a basic file size of 2400 x 3000 pixels x 3 bytes/pixel = 21,600,000 pixels, which is 21.6 megabytes.
(*see glossary, on how a computer calculates*)

Also, each pixel of an image increases in size when its colour depth increases—an 8-bit pixel (1 byte) stores 256 colors, a 24-bit pixel (3 bytes) stores 16 million colors, the latter known as truecolor

Note: To be perfectly accurate you must divide by 1024 to change from bytes to kilobytes, or from kilobytes to megabytes. For simplicity, most people divide by **1000**, as has been done in these calculations.

File compression. There are two types of file compression, "**lossy**" and "**lossless**". Lossy compression actually changes some of the original pixels and some details are lost. The most common format of lossy compression is JPEG. While the original JPEG image out of a digital camera is fine, every time the file is saved again, detail is lost. If the same file is saved as a JPEG several times, significant quality is lost and cannot be recovered. Valuable originals should always be saved in a lossless format, like TIFF or PSD. TIFF files can be edited and saved any number of times without loss of detail because the compression does not alter any pixels. The trade off is that TIFF files do not compress as well as JPG.

Image Formats. Image file formats are standardized means of organizing and storing images. Image files are composed of either pixel or vector data that are rasterized to pixels when displayed on a computer monitor. The pixels that compose an image are ordered as a grid (columns and rows); each pixel consists of numbers representing magnitudes of brightness and color. Including proprietary types, there are hundreds of image file types. The JPEG, PNG, and GIF formats are most often used to display images on the Internet. Digital cameras typically save images in the JPEG format which is a lossy format, meaning image compression takes place to save memory space and maximize the number of files one can fit on a memory card or hard drive. Other formats include TIFF, PSD, RAW, and BMP.

Storage Methods

Once you know the basic size of your files, you can then decide which of the many storage devices are most appropriate for you. The following storage methods are:

- Hard disk
- Removable media (include CDs, DVDs and Blu-Ray disks, as well as diskettes and USB drives.)
- Memory cards

3. EDITING DIGITAL IMAGES

Editing a digital image means correcting tonal values, color, detail, and image flaws.

Image-Editing Software

The software that makes it possible to perform editing operations on a digital image using the computer is called image-editing software. Adobe Photoshop is an example of professional image-editing software. There are numerous other brands on the market, but most of them closely emulate the basic operations of Photoshop, though they may not offer as many features.

Photo Editing Basics

Here are the key steps for editing your photos:

A. **Crop your images and clean them up**.

Crop images: It's best to crop to improve minor compositional details, like distracting elements at the edge of the frame or repositioning your subject slightly.

Spot-clean images: The outdoors is a dusty place and nature's gritty elements have a way of finding their way onto your camera lens, and then onto your photos. (Using a lens brush regularly in the field cuts down on this.) Most editing programs have a spot-removing tool. The name varies: "clone stamping" and "spot healing" are two variations. Programs also let you change your view of a photo to highlight the location of spots. Work your way methodically around your photo until you have a spot-free image.

B. Adjust white balance.
White balance relates to color levels, not exposure levels. If your image has an overall color tone that you find displeasing or unnatural, you can adjust white balance to fix it. Note that JPG files, because they capture far less digital data than RAW files, offer a minimal amount of white balance adjustment during editing.

Most editing programs let you pick from preset modes like "flash," "daylight" or "cloudy" to better calibrate the image for the lighting conditions when it was shot. In addition, many have both a "temperature" and a "tint" slider that you can fiddle with to fine-tune the overall lighting cast on an image.

C. **Adjust exposure and contrast**.

Adjusting exposure: This is the process of making the photo exactly as bright or dark as you want. Note that "noise" (a mottled look) can sometimes be introduced when you crank up the brightness. That's why it's always better to get the correct exposure (one that's sufficiently bright) when you first take the photo.

Adjusting contrast: Contrast is the range of dark to light tones. When it's extra high, you see a stark image, where all tones, regardless of color, are either very dark or very light. When it's extra low, you see a flat image where no elements in the frame stand out. Typically, you want a middle contrast that avoids either of those extremes. But if you prefer either of those effects, you can adjust the contrast to achieve that.

D. **Adjust color vibrancy and saturation**.

Once white balance is adjusted, you can further refine colors in your photos with the saturation and vibrancy controls. The distinction between the two is subtle: Increasing vibrancy increases color intensity in neutral color tones and maintains color intensity in the brighter colors. Increasing saturation makes all colors throughout the frame more intense. When bright colors pop, it can give the photo a more dramatic look.

E. Sharpen images.

Sharpening an image gives it a crisper, cleaner look. Many programs offer multiple sharpening tools. Begin by adjusting the overall amount of sharpness (on a scale from 0 to 100). Start at 50 percent, then adjust the level up or down to get the sharpness you prefer.

Experiment with your editing program's additional sharpening features to see the effect each produces. One you might try is a “clarity” or “structure” tool. It makes the edges of objects in the photo stand out more, giving the overall image a punchier look.

4. **OUTPUT METHODS**

There are two basic categories of digital image output: (1) printing the image on paper; and (2) printing the image to photographic film. A wide variety of equipment and materials are available, and your choices can heavily affect the resultant quality. The possible routes for printing digital photographs on paper include com**puter printers**, offset printing presses, and **digital enlargers**. Digital photographs are printed to film with a device called a **film recorder.**

Computer Printers. Computer printers are available in several types, but the most common are inkjet and electrostatic (usually called laserjets).

Offset printing . **Offset printing** technology uses plates, usually made from aluminum, which are used to transfer an image onto a rubber "blanket", and then rolling that image onto a sheet of paper. It's called **offset** because the ink is not transferred directly onto the paper.

Offset printer

Digital Enlargers. Digital enlargers currently supply the highest reproduction quality photographic prints in large sizes, by printing digital files directly to traditional photographic papers. The LightJet 5000, for example, uses red, green, and blue laser beams to expose the paper directly in print sizes up to 50 inches square. These machines are very expensive and require processing facilities for traditional print materials.

Lightjet 430 photographic Laser printer

Film Recorder. Film Recorders Film recorders expose film to the photographic image directly from the digital file. Older types of film recorders contain a high-quality cathode-ray tube (CRT) monitor, which is photographed onto film via an optical system. Newer film recorders use laser beams, much like digital enlargers, to directly expose the film and provide much sharper, cleaner results.

Electronic Distribution of Digital Images

One great advantage to digital photographs is that they can be transported easily in electronic form. You can record images on storage media, like magnetic or optical disks, and send them to others to view on their computer. You can also send and receive digital images over phone lines or via satellite using modems. If you wish to distribute your photographs electronically, the easiest ways are to put them on magnetic or CD-ROM disks or to make them available on the World Wide Web by placing them on a Web site.

Application.

Direction. Identify to which stage of image production do the following processes belong. Write the letter of your choice.

Activity 3. Identifying the stages of image production

Stages of image production:	
A. Creating the image	C. Editing the image
B. Storing the image	D. Outputting the image

	Processes involved during the image production
1.	Know the image digital file size in order to produce a quality print.
2.	Categorize on how the digital image will be produced. Is it to be printed on a paper or printing the image to photographic film.
3.	Correcting the image using an image editing software.
4.	Capture the image using a digital camera.
5.	Identify the various file formats an image can be saved.
6.	Know what storage media such as such as hard disk, USB drives or memory cards will be used in saving the image.
7.	Determine variety equipment or devices in order to produce the image such as computer printer, digital enlarger, offset printing, or film recording.
8.	Know what are the basic editing techniques to enhance an image.
9.	Determine the image resolution.

Reflect

Complete the statements below.

I understand _____

I don't understand _____I

need more information about _____

Reinforcement & Enrichment

Activity 3. Planning for an image production

Given of a theme: "**PUTTING AN END TO COVID-19 VIRUS PANDEMIC .**"

1. Visualize the kind of image you want to capture.
2. Discuss in detail how do you plan to produce the image.

Assess Your Learning

I. Multiple Choice. Read each item very carefully. Select the **letter** of your choice.

1. If a file has the size of 1024 kilobyte , what is the equivalent size of the file in megabyte?
   a. 1 b. 10 c. 100 d. 1000
2. What is the required pixel of an image to be printed in a short size bond paper ?
   a. 1200 x 1800 b. 2400 x 3000 c. 2550 x 3300 d. 3300 x 4800
3. The two numbers to determine pixel of an image are its _____ positions.
   A. height & width b. vertical & horizontal c. Height & length d. width
4. What is the file size of an image having 3300 x 4800 pixels x 3 bytes/pixel?
   a. 39.34 MB b. 47.00MB c. 47.5 MB d. none of the above
5. Which of the following statement is TRUE about creating image ?
   a. The lesser dots that appear per inch, the finer the quality of the image appears to the eye.
   b. Smaller dots represent darker tones, and larger dots represent lighter tones.
   c. Colors can be reproduced in dot-based images**.**
   d. All of the above
   E. None of the above
6. The combination of total number of pixels available in an image and the size at which it is output results in a specific number of pixels is called?
   a. Bit depth b. File size c. File format D. Resolution
7. Image resolution is measured in _____.
   a. Bits b. Megabyte c. Kilobyte d. PPI
8. Which one of the following is an example of a graphic/image file format ?
   A. GIF b. PNG c. JPEG d. All of the above
9. Which one of the following means where we can put or distribute digital images
   a. World Wide Web b. CD-ROM disk c. Mobile phones d. all of the above
10. What specific tool in an image editing software will you use if you want the image to appear crisper or with a cleaner look?
    a. Temperature b. Tint c. Sharpening d. Exposure
11. The higher the saturation of a color, the more vivid and intense it is.
    A. True b. False
12. In Lossless compression, when files are saved several times, significant quality is lost and cannot be recovered.
    A. True b. False
13. What editing tool that removes unwanted outer areas from a photographic or illustrated image.
    a. Clean b. Exposure c. Sharpening d. Crop
14. What do you adjust when you want to lighten the tone of an image?
    A. Exposure b. Saturation c. Contrast d. Temperature
15. Which of the following does not belong to the group?
    A. Film recorder b. Computer printer c. CD-ROM d. Digital enlarger

References & Photo Credits

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Prepared by: MARICAR R. PORNEL, Teacher 1

GLOSSARY

Bit Depth

The bit depth for an image refers to the number of bits of data that are given for each pixel, and determines the number of shades or colors that can be represented. A single bit image has one binary digit per pixel and can only show two colors or shades per pixel (e.g., black and white). In a grayscale image using 8 bits per pixel, 256 shades of gray can be represented. A variation of 8-bit depth is **indexed color**, in which each of the 256 numbers is assigned a specific color, giving up to 256 possible predetermined colors. A 24-bit RGB image has 8 bits per color and the total combinations give 16,777,126 possible colors. Some scanners provide images with higher bit depth, but most image editing software will not handle more than 8 bits per color channel. Increasing the bit depth past 8 bits also increases file sizes and makes the images harder to manage. ■

Bit Depth of 1, Giving Two Tones or Colors.

Bit Depth of 8, Giving 256 Tones or Colors.

Bit Depth of 24, Giving 16,777,216 Tones or Colors.

How a Computer Calculates

The heart of the computer is the central processing unit (CPU). The CPU is a solid-state "chip" that does the actual computation. Since the electronic switches in the chip can only indicate "off" or "on," each switch can represent just two digits, 0 and 1. For that reason, computers calculate numbers in binary (base 2) form. Starting from the right, in a binary number the first digit represents units, just as in base 10, allowing us to count 0 and 1. Since we are now out of numbers, the next digit to the left is used to represent 2s. The third digit from the right represents 4s (2 × 2) and so on. The chart at the right shows how the binary numbers compare to base 10 numbers. As you can see, it takes eight binary digits to count from 0 to 255.

Each binary digit is called a **bit.** Eight bits are called a **byte** and can represent up to 256 numbers (0 through 255). In digital imagery, an eight-bit binary number can represent 256 shades of gray or 256 colors. The amount of data it takes to represent an image is given in bytes or multiples of bytes. The data is stored together as a **file.** The size of the file depends on how many numbers are associated with the image. ■

BASE 2		BASE 10
0	=	0
1	=	1
10	=	2
11	=	3
100	=	4
101	=	5
110	=	6
111	=	7
1000	=	8
•		•
•		•
•		•
11111111	=	255
100000000	=	256

8 bits = 1 byte
1024 bytes = 1 kilobyte (KB)
1024 KB = 1 megabyte (MB)
1024 MB = 1 gigabyte (GB)

File Formats

TIFF: Tagged-Image File Format. This is the most popular image file format, output by many scanners and accepted by service bureaus. TIFF format offers a lossless compression scheme known as LZW.

Photoshop (PSD): This is a file format designed by Adobe specifically for use in Photoshop. It supports the many features, such as layers and channels, which are available in Photoshop. It provides lossless compression. Photoshop can also save files in other formats.

JPEG: The Joint Photographic Experts Group (JPEG) developed this compression format to provide small files. It has different quality levels that control the amount of compression. It is a "lossy" format, but using the higher quality settings will reduce data loss somewhat.

PICT: Picture File Format, offering lossless compression and often used in multimedia applications. PICT can be used in combination with JPEG compression, in which case data loss is suffered.

EPS: The Encapsulated PostScript (EPS) file format is designed to provide page layout information to postscript type printers, and contains information for the printer.

GIF: Graphics Interchange Format, designed for use on the Internet. GIF provides lossless compression for images up to 8 bits (grayscale or indexed color).

PDF: Portable Document Files. Compressed versions of files that can be transported across the Internet and read by PDF readers such as Adobe Acrobat Reader. ■

Comparison of File Sizes for Different File Formats*

EPS	3.3 MB	JPEG Maximum Quality	637 KB
TIFF uncompressed	2.3 MB	GIF (Indexed Color)	540 KB
Photoshop (PSD)	2.2 MB	JPEG Medium Quality	168 KB
TIFF LZW compression	1.6 MB	JPEG Minimum Quality	101 KB

*From a 24-bit RGB image 800 × 1000 pixels with no extra channels or layers.