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Overview: Digit-eyezed Through the Eyes of A Child

I.   Are You Ready To Become "Digit-Eyezed?"
Introduction To Digital Photography
Explain the usages of digital photography as well as equipment needed for digital photography; show the children a digital camera, scanner, computer, printer, etc.; explain the process of taking a picture, downloading it into the computer, making any changes in the picture, and printing the picture; children are also shown the scanner and how it can be used with digital photography and also as artwork.

During the first class session, the children are notified that a journal will be kept which contains key points from each class, notes, vocabulary, their feelings, comments and reflections.   Students will also be notified that they will be keeping a digital-art portfolio of their work throughout the class. A culminating activity (**performance assessment)** will be to put photographs taken by each child throughout the course on display; each child will have four matted photographs on display at the art critique. Children will learn how to critique their own pictures as well as the work of others.

II.   The Features of a Digital Camera
Explain the parts of a digital camera (handgrip, strap, electronic flash, optical viewfinder window [front and back], hot shoe for external flash attachment, color LCD viewfinder/ display, zoom lens, battery compartment, control buttons and knobs [flash, playback, camera, power on/off, disk eject, display, program, picture effect, zoom, brightness/contrast], slot for removable media [compact flash, smart media, etc.], LCD status readout); show children the different types of cameras. The importance of taking proper care and usage of equipment are highlighted, i.e. the strap always stays around your neck in case the camera is dropped, etc. Considerations which can affect photographic quality are discussed (the lens, camera size, LCD monitor, power source, image quality, output sockets, removable storage and exposure and flash). Students compare advantages and disadvantages as well as features of a 35mm camera vs. a digital camera.

III.   How Digital Images Are Made Up
Discuss the following concepts: pixels, resolution and file size and how these qualities help to improve the photograph. *What is resolution?* Students will be shown how pixels make up a digital image; the continuum of no picture to a perfectly clear picture is examined. Students will receive a vocabulary sheet to study. The vocabulary sheet must be stapled into students' journals and kept as a reference.

IV.   Lights, Camera, Action
Alas, we are ready for students to use the cameras. Students will be paired with a partner. Each team will be assigned a camera and either a disk or a smart card. Students select a subject matter to take pictures of (for example, shapes, colors, trees, recycling, cars, flowers, texture). Each student will take from 10 to 15 pictures during this session.

Students will travel outdoors and around the school grounds. Students are reminded that they must remain with their partners at all times. Students are given approximately 30 minutes and must all return to the room at a given time, at which time equipment is returned and checked in. Disks/smart cards are removed and equipment is stored.

V.   Computers, here we come!
Students now learn how to take the disk/smart card images and use the computer programs, "*Adobe PhotoShop 5.5*" and "*Picture It*!" The teacher demonstrates how to crop a picture, enlarge a picture, change the color, distort the picture, add layers to the picture, rotate the image, add filters to change the picture, superimpose images, make a translucent layer and other design features. The teacher demonstrates how to use the scanner and combine something which is scanned with a digital picture. For example, if a student takes a picture of a palm tree, one can then combine palm leaves from Mother Nature with the digital picture. Students start working with their images and the computer to create new images or change features in the existing photo. *Discussion Question: Can you see why "seeing is not always believing" and in today's courtrooms, photographs and videos are not admissible as evidence since anyone can change images and history!*

VI.   Now The Printing Begins!
The teacher demonstrates how to use the printer and how to set up the image size, canvas size, and how to set the printer with the proper settings and papers (photo, mat, gloss, shiny). Students go to the computers, get their pictures ready to print, get the approval of the teacher to send the images to print and start printing away! When the pictures are done printing, all photos are stored safely in each student's portfolio. At this point and during subsequent meetings, each pair of students is more or less working on individualized levels, pacing and projects. For example, some students are working on the computer, some are printing, and another team may decide to return to the outdoor campus to retake a particular picture. A hands-on learning experience for each pair of students is evident since each team is at a different point on the continuum of learning.
After images are printed, the teacher demonstrates to students how to store and catalog images so that the images can be reworked in future sessions.

VII.   Digital Prints, Hot Off the Printer!
The teacher continues to illustrate techniques of the computer programs: cropping, enlarging, enhancing images, grayscale, RGB, CMYK, improving sharpness, removing red eyes, toning and tinting, dodging and burning, distorting and stretching and changing colors. Students continue to take pictures and fulfill their independent projects. Students now have enough knowledge to work on their own. The teacher facilitates each group while students continue to work independently. If students wish to change the subjects of their projects, they may do so. Students may decide to take one picture and scan a background. The classroom is a busy workroom.

VIII. Matting Made Simple
Students are reminded of their final project, its requirements and due-dates. By this class, each student should be sure that s/he has four prints to be matted for the critique and art show. The post-test will be given. Journal check will take place. Teacher looks at each digital portfolio to see the variety and quality of the contents. In addition, the teacher gives students a lesson on different types of mats (all four sides the same such as 4 x 4, opposite sides of mat are equal such as two sides of two inches and two sides are 4 inches). Students mat the four selected pieces and decide which mat fits the image(s) best.

IX. Digitized Critique
Tests are graded, returned and discussed. Each student writes a reflective piece on highlights of the course. Questions such as the following may be used to summarize and reflect on the digital experience: *How was the course useful in other subject areas? What did you enjoy most/least about the class. What changes would you make to improve our course? Do you feel you would be willing or able to mentor other students who have never used digital photography equipment before? Has our course inspired you to want to continue your study and perhaps purchase equipment to use at home?* All students hang up their four pieces of digitized art. A group discussion occurs as each child orally presents the four selected pieces. The teacher shares reflections and insights gained during the course. At this point, the school now has a committee of students who can be called upon to photograph special events, and work on the school newspaper and yearbook. Later at the end of the year, an art show entitled, "Digit-eyezed Through A Child's Eyes" is held to celebrate children and the merging of the worlds of art and technology.

Sunshine State Standards

Language Arts

Reading:
The student uses the reading process effectively. (LA.A.1.2)

Writing:
The student uses writing processes effectively. (LA.B.1.2)
The student writes to communicate ideas and information effectively. (LA.B.2.2)

Listening, Viewing, and Speaking:
The student uses listening strategies effectively. (LA.C.1.2)
The student uses viewing strategies effectively. (LA.C.2.2)
The student uses speaking strategies effectively. (LA.C.3.2)

Mathematics

Number Sense, Concepts, and Operations
The student understands the different ways numbers are represented and used in the real world. (MA.A.1.2)
The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving. (MA.A.3.2)

Measurement
The student measures quantities in the real world and uses the measures to solve problems. (MA.B.1.2)
The student estimates measurements in real-world problem situations. (MA. B.3.2)

Geometry and Spatial Sense
The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed. (MA.C.2.2)

Algebraic Thinking
The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions. (MA.D.1.2)

Science

The Nature of Matter
The student understands that all matter has observable, measurable properties. (SC.A.1.2)

The Nature of Science
The student understands that science, technology, and society are interwoven and interdependent. (SC.H.3.2)

Social Studies

Time, Continuity and Change [History]
The student understands historical chronology and the historical perspective. (SS.A.1.2)

Visual Arts

Skills and Techniques
The student understands and applies media, techniques, and processes. (VA.A.1.2)

Creation and Communication
The student creates and communicates a range of subject matter, symbols, and ideas using knowledge of structures and functions of visual arts. (VA.B.1.2)

Cultural and Historical Connections
The student understands the visual arts in relation to history and culture. (VA.C.1.2)

Aesthetic and Critical Analysis
The student assesses, evaluates, and responds to the characteristics of works of art. (VA.D.1.2)

Applications to Life
The student makes connections between the visual arts, other disciplines, and the real world. (VA.E.1.2)

Helpful Hints

1.   Invite a guest speaker to talk to the class about digital photography. Contacting a local university's art department or school district's art department may be useful.

2.   Go to a digital photography art show. Check your local newspapers or art museum for a current list.

3.   Get magazines on digital photography so teachers and students can see updated equipment, digital artists and articles of interest.

4.   Bring in ads from newspapers to show students where objects used in the course may be purchased. Price comparisons may help students not only become acquainted with the latest equipment and sales, but reading and mathematics skills can also be enhanced.

5.   Have students bring in pictures that they have taken with a regular camera. In class, compare the similarities and differences between pictures taken with a digital camera vs. 35 mm.

6.   Have each student find a website having to do with digital photography. Each student reports on the website found. Students add the website's address to a chart or poster in the classroom so that an ongoing list is kept.

7.   Discuss with students the following questions:
   - What makes a good picture?
   - Does it have to be perfect?
   - How many different ways can you "see" the same image in a picture?
Help students find shapes, colors, designs, lines and other forms of compostion in each photo so that learners understand that all pictures do not have to contain people.

8.   Discuss with students the following questions:
   - How can digital photography be a profession?
   - How can digital photography be used?
   - What fields use digital photography? (i.e. movie making, newspapers, etc.)

9.	Students can discuss the possibility of starting a digital photo club and how the club can be useful to teachers and students in the school. (i.e. Student of the week photos, volunteer luncheon, special activities, etc.)

10.	Help students already using digital photography become mentors to other students who may have never experienced becoming "digit-eyezed."

11.	Incorporate digital photography into all subject disciplines. For example, the art teacher can ask teachers of other subject areas, "In what skills or areas are your students experiencing difficulty?" A project can then be put together so that digital photography can assist in weak areas. For example, if students are having trouble in geometry, the digital camera can be used as students are asked to find lines and shapes around the campus, take pictures and title the pictures.

12.	Invite parents or volunteers to come in and let students share the contents of the course with the visitors.

13.	Work with the school's PTSA in order to raise funds to purchase more equipment.

Lesson I
Are You Ready To Become "Digit-Eyezed?"
Introduction To Digital Photography

Objective(s): To become familiar with various components of digital photography;
To develop and build an art/technology vocabulary;
To understand the terms related to the computer and each term's function;
To understand the processes involved with saving and storing digital images.

The teacher asks students: *Have you ever been to a photography exhibit? Have you ever taken pictures? What kind of camera(s) have you used? What do you think is important if someone wants to take good pictures?* The teachers shares some of the goals of the course. *Are you ready to become "digit-eyezed?" What do you think this means?* The teacher shares with students a vision that by learning how to use a digital camera, students might begin to see the world through different eyes and become more environmentally aware of ones surroundings. The teacher explains how the areas of technology and art can easily be incorporated to enhance all other areas of the curriculum. Each student is required to have a journal and at the close of each session will record key points/ a reflection on what was learned during the session. The teacher discusses another goal of the course, namely that each student will be selecting a theme or subject area and will be working with a partner to take pictures which will eventually be printed, matted and displayed in an Art Critique at the end of the course.

Vocabulary Word Cards

Digital camera	**Download**
Printer	**Kodak Photo CD**
Flatbed Scanner	**Monitor**
CD-Rom Drive	**Hard Disk Drive**
RAM	**Computer**
Hardware/Software	**Mouse**
Portfolio	**Keyboard**

Activity: The teacher discusses each vocabulary term as students are asked to match each word card to the correct item.

Journal: Students record notes or sketches in their journals.

Group Discussion: The teacher shares some of the contents of his/her portfolio or samples of digital photographs so that children can see examples of the vocabulary terms as well as their usages and functions.

Teacher and students record a journal entry: What would I like to Accomplish In This Course? What theme or subject would I like to study and take pictures of for our class project? What do you think digital photography is? How is it used?

Lesson II
The Features of a Digital Camera

Objective(s): To compare and contrast 35 mm. vs. digital photography;
To identify features of a digital camera.

Activity 1: The students complete a handout identifying the features of a digital camera as the teacher explains and demonstrates (handgrip, strap, electronic flash, optical viewfinder window [front and back], hot shoe for external flash attachment, color LCD viewfinder/ display, zoom lens, battery compartment, control buttons and knobs [flash, playback, camera, power on/off, disk eject, display, program, picture effect, zoom, brightness/contrast], slot for removable media [compact flash, smart media, etc.], LCD status readout).

Directions: On line one, name each feature of a digital camera. On the second line, include a brief description of each feature using a complete sentence.

Activity 2: The students and teachers will complete a Venn Diagram comparing and contrasting two types of cameras: digital vs. 35 mm. Statements such as the following will be discussed and placed in the proper section of the Venn Diagram.

- Film requires developing
- Uses film
- Camera must be held up to the eye
- Camera is held below the eye
- Needs to be focused
- Instant pictures are possible
- Needs a battery
- Needs an electronic flash
- Uses a memory card
- Easy to use
- Pictures can be easily cropped or modified using a computer

Ask students to place additional statements or camera features not listed to their Venn Diagrams.

Journal: Which type of camera do you prefer to use? Why?

Extended Activity: For home learning, students can use the newspaper to comparison shop both types of cameras. Which brand and model would you choose to purchase? Why? Students can find the difference in prices between the same cameras sold in different stores or between different cameras sold in one store using newspaper inserts or store flyers.

Lesson III
How Digital Images Are Made Up

Objective(s): To use appropriate vocabulary;
To sequence pixels from least to greatest resolution.

Activity 1
Using vocabulary hand-out of glossary (at the end of this booklet), the teacher defines and illustrates key terms. Students take turns identifying the correct term as the teacher or another student reads a definition. Conversely, the teacher can call out a term and ask students to read the definition. Vocabulary flashcards can be made using index cards. Students are asked to write "save" on the vocabulary handout and staple it to their journals.

Activity 2
(Use pages 16 and 17 as a hand-out. Each student receives an envelope with ten squares of the same digital picture and must sequence the images in order from the lowest number of pixels (1 x 1 pixel resolution) to the highest pixel resolution (512 x 512). Images can be glued to a piece of manila or construction paper. Students make up an appropriate title for their paper.

Extended activity: Do students see any pattern between the numbers 1 x 1, 2 x 2, 4 x 4, 8 x 8, 16 x 16, 32 x 32, etc? Discuss the concept of exponential growth, if appropriate. *What number of pixels would come next if we continued the pattern? Explain.*

Activity 3
Journal: What is a pixel? Why are pixels important to a photographer?

Lesson IV
Lights, Camera, Action

Objective(s): To become more aware of ones surrounding;
To gain comfort and confidence with using a digital camera;
To work collaboratively with a partner;
To understand what comprises good composition and what is a subject in photography;
To incorporate digital photography with other subject areas, such as science, English, and mathematics.

The teacher brainstorms with children a list of possible topics for projects. The teacher encourages children to follow their interests, hobbies or favorite subjects when selecting a topic for the project. Students select partners based on personal choice. In teams of two, one student may wish to study trees while the other wishes to explore cars. Equipment is shared; one camera per every two children (or as budget allows).

Before children depart for their first field experience, the subject of having ones eye tuned into what makes a good picture is discussed. For instance, maybe one wishes to capture the center or petals of a flower as opposed to the entire plant or a field of 20 flowers. As students take pictures and return to the classroom, they will learn more about "good composition" through group discussions and hands-on work. Concepts of size, lighting and image quality are also explored when children return to the classroom and return their equipment.

Here is a sample of a daily log which can be used to keep track of equipment and student work:

			TIME	
Name of student	Project Title	Equipment Borrowed	Sign-out	Sign-in
1.				
2.				
3.				
4.				
5.				
6.				

Journal: What did you experience today? How did it feel to use a digital camera? In what ways did you become more aware of your surroundings? What might you do differently next time? Do you like the topic you selected for your project or would you like to change it? Were you and your partner able to work cooperatively?

Lesson V
Computers, here we come!

Objective(s): To learn how to use technology of computer hardware and software (programs of *Adobe PhotoShop* and *Picture It!*);
To understand how to use the toolbar palette and all the symbols it contains;
To incorporate use of the scanner with their images.

Students download the photos (taken last session) into the computer. They begin using the computer programs. They will practice experimenting with the various features of the computer programs and learn how to: rotate pictures, crop pictures, straighten a crooked picture, sharpen a blurry picture, fix the brightness and color of a picture, remove red eyes from a picture, add text to a picture, and how to save an image. Students will take several of their pictures and modify the picture in as many different ways as possible to gain familiarity with the software. In addition, students will explore the following tools on the toolbar palette: marquee/crop, lasso, airbrush, rubber stamp, eraser, blur/sharpen/smudge, pen, measure, paint bucket, hand, move, magic wand, paintbrush, history brush, pencil, dodge/burn/sponge, type, gradient, eyedropper and zoom.

Next, students place objects on the scanner and learn how to save their images. Photographs will be combined with scanned objects.

Activity: Students label the correct symbol and feature of each icon (from the toolbar)on the worksheet entitled, Toolbar Palette.

Journal: Which is/are your favorite tool(s) on the toolbar? Why? How did you feel when you first began to modify and change your original picture? Explain.

Lesson VI
Now The Printing Begins

Objective(s): To learn how to use the printer;
To become familiar with the different types of photographic papers, such as matte finish, glossy finish, cardstock, & semi-gloss finish.
To combine scanned picture with the digital picture and print on photographic paper;
To create a portfolio containing an ongoing array of student work;
To set the printer using the settings of grayscale, RGB, image size, paper size and type of paper.

Students prepare their digital pictures to be sent to the printer after the teacher verifies that the correct settings are being used. Students print pictures and the excitement really builds. The teacher discusses with students: *Who can retrace the steps we took to get to this point of printing an original photo?* Students sequence the following ten statements recalling their digital footsteps as seen through their newly "digit-eyezed" eyes. Using the worksheet which contains ten (unnumbered)statements, students sequence the order of their digital journey.

(Answer Key)

1. Select a topic for class project.
2. Join with a partner to begin field work.
3. Take 10-15 pictures and return to classroom.
4. Download pictures into the computer.
5. Start to explore software programs which modify images.
6. Use the toolbar palette and image editor to further modify images.
7. Use the scanner.
8. Set up the printer properly.
9. Explore different types of paper when printing pictures.
10. Let the printing begin!

Ten Steps For Becoming D-i-g-i-t-e-y-e-z-e-d

Directions: Place the ten statements in the correct sequence.

Let the printing begin!

Take 10-15 pictures and return to classroom.

Download pictures into the computer.

Select a topic for class project.

Start to explore software programs which modify images.

Join with a partner to begin field work.

Use the toolbar palette and image editor to further modify images.

Set up the printer properly.

Explore different types of paper when printing pictures.

Use the scanner.

Lesson VII
Digital Prints, Hot Off the Printer!

Objective(s): To further explore features of software programs, such as cropping or changing colors on the image;
To recognize pictures using filters, distorting and classic photo effects;
To combine two and three layers into their pictures.

Students continue working in order to meet project requirements: 1.) selection of four pictures to be matted in the next class session and 2.) organization of portfolio to be ready for teacher to review. Students work at their own pace, taking pictures, working with computers and software, scanning, printing, modifying pictures, etc. The classroom is a working digital laboratory.

Journal: Describe the contents of your portfolio. How did you go about changing your pictures? List the different ways you have learned to modify your picture from its first image to its final phase?

Lesson VIII

Matting Made Simple

Objective(s): To understand different types of mats and how a mat can enhance a picture;
To measure and cut mats according to specific size requirements;
To select the four pictures which will be matted and displayed during the Art Critique.

The teacher shows students how to make a mat. Materials needed are a ruler, mat board, cutter, pencil and masking tape. The first mat demonstrated has a four inch border on all four sides. For example, if our picture is an 8 x 10 photo, our mat will add four inches to all sides and therefore make the picture a 16 x 18. The next type of mat is three inches wide on the right and left side, and a four inch mat on the top and bottom of the picture. For example, if a picture is 5 x 5, the matted picture will become 11 x 13.   After the mats are cut, each picture is centered and taped evenly. The teacher demonstrates how pictures are signed and dated on the bottom left corner.

Journal: Describe two different ways to mat a picture. What materials did you use? What do you find most challenging about matting pictures?   Can you think of any other ways to mat a picture?

Lesson IX

Digitized Critique

Objective(s): To evaluate digital pictures;
To evaluate the usage of technology (i.e. toolbar, scanner, software);
To give an oral presentation describing the content of four digital pictures;
To consider the feelings of each student during the critique.

Each student hangs four selected pictures on a designated wall. After all works are on display, students walk around the room in silence observing each piece. The teacher gives students a sheet entitled, "Rules for Critiquing." The teacher selects one person's pictures, makes a few comments and subsequently asks each student to present his/her project. The teacher opens the floor for student discussion before moving on to the next student's work. After the critique is finished, the teacher collects each student's portfolio and reviews the contents.

Students who have completed the course in digital photography are now ready to become mentors for other students who want to learn. In addition, the students are now ready to help with the school newspaper, yearbook and other school activities. These digital photographers receive a certificate upon the completion of the course.

Journal: How do you feel that digital photography has helped you? How was the course useful in other subject areas? What changes would you make to this course?

Rules for Critiquing

1. **Observe each piece of art work carefully.**

2. **Can you tell what features were used in the digital pictures?**

3. **Was the subject matter easy to identify?**

4. **Can you identify the usage of the scanner?**

5. **Can you tell which is a cropped image?**

6. **Can you see where the colors have been changed?**

7. **Have filters been used in any of these pictures?**

8. **Has there been any rotation in any of the pictures?**

9. **Which is your favorite picture?   Why?**

10. **How would you rate the quality of the overall work?**

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Computer Programs:
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Photo Shop 5.5 by Adobe.

Magazines:
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Websites:
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Enlargements   www.alta-mira-group.com

Raynov   www.digitaletc.com

Tiffen   www.tiffen.com

Glossary

CD-ROM CD-ROMs look just like regular compact discs, but they have computer programs or files stored on them. You can't copy files onto a CD-ROM, you can only read them. (ROM means Read Only Memory.) CD-ROM can also refer to a CD-ROM drive, which is where you insert CD-ROM disks.

CD writer Hardware unit that lets you write your own CDs – ideal for storing large number of images.

Clone Using the clone tool in an image editor, you can quickly and easily duplicate one part of a picture in a different part of the image. By painting in this way, you can "erase" unwanted parts of a picture or add special effects like creating twins out of one of your kids.

Compression Process that reduces the size of a digital image so that it requires less storage space, transmits more quickly by e-mail or downloads faster from the Internet.

Computer An automatic electronic machine that can store, recall, and process data.

Contrast Difference between the lightest and darkest parts of the image.

Copy and Paste If you want to make a copy of something on your computer – like a part of a digital picture – you can copy it to the Windows clipboard. Usually, you can do this by selecting what you want to copy and choosing Edit, Copy from the program's menu bar. When you later choose Edit, Paste (it doesn't even have to be the same program) you'll make an exact duplicate of whatever you originally put on the clipboard.

Crop To cut away parts of the image that are not required.

Depth of Field The depth of field is the region in front of the camera that will be in sharp focus when you take a picture. Depth of field depends upon such variables as the shutter speed of the camera and the aperture setting of the lens. A big depth of field puts most of the picture in focus, while a shallow depth of field blurs most of the scene.

Digital Camera (digicam) A camera that uses a CCD and computer memory instead of film to expose and develop pictures.

Digital Film Memory cards – like Compact Flash and SmartMedia – which your digital camera uses to store your pictures are sometimes called digital film.

Digitize To create a digital image – normally by means of a scanner or digital camera.

Disk A general term for any magnetic computer storage device. A hard disk drive is permanently enclosed in your computer. A floppy disk is a square palm-size removable disk. A CD disk resembles a large flattened donut.

Download Receiving a file/image from a remote computer, often via the Internet, and generally using a modem (opposite of upload).

DPI   Dots Per Inch, an indication of the resolution of a computer monitor, scanner or printer. The higher the resolution, the better the quality.

File   Information that your computer programs use are stored in individual files. A digital picture is a file, as is a word processing document.

File Format   The way in which the image is stored (See TIFF, JPEG and GIF).

Filter   There are two kinds of filters currently available. Camera filters screw or snap onto the front of the lens to modify the picture. Plug-in filters are small computer programs that run inside your image editor and give your images special effects.

Floppy   Small, thin disk with 1.44 Mb of storage.

Folder   Computer files are typically stored in folders on your computer's hard drive. A folder is also known as a directory, and it's just a convenient way to organize your data.

GIF   Graphical Interchange Format, used to display images on the net. JPG is better for photographs, as a GIF is limited to 256 colors.

Hard disk / hard drive   Computer hardware that is used for storing images and other files. Some hard disks are built-in, some separate, others removable.

Histogram   A graph that shows you the distribution of light and dark pixels throughout your picture.

Image-editing software   Computer program which can be used to acquire, manipulate and store digital images.

Inkjet printer   Popular color printer capable of producing photo-quality prints.

JPEG   Joint Photographic Expert Group – the most popular type of image-compression format.

LCD   Most digital cameras use a Liquid Crystal Display (LCD) on the camera back as a digital viewfinder. The LCD also gives you access to camera menus.

Magic Wand   Image-editing tool that automatically selects areas of similar-colored pixels.

Megapixel   Cameras measure their resolution in how many pixels their pictures can hold. A one-megapixel camera is fairly low resolution, only able to generate high quality prints up to about 4 x 6 inches. Most high-quality cameras today capture about 3 megapixel images.

Memory Card   Most digital cameras use removable memory cards to store pictures. Memory cards come in a variety of formats, like Compact Flash, SmartMedia, and Memory Stick. You need to use the kind of card that fits your camera.

Menu   Available by buttons at the top of almost every Windows program, menus give you access to all of the controls and settings of the program. You use the left mouse button to select menu items.

Monitor   The screen which allows one to see information.

Mouse   Device which can be clicked to give computer commands.

Optical Viewfinder   Direct viewing system found on some digital cameras.

Picture CD   Mass-market digital format with all the images from a processed film stored on a CD and returned with the prints.

Pixel   Short for Picture Element, a tiny square of digital data containing details about resolution, color and tonal range.

Pixellation   Unwanted (usually) effect in which the pixels become so large they are visible to the naked eye.

Portfolio   An ongoing compilation of student work which shows growth over time.

Printer   Computer peripheral for making hard-copy prints.

RAM   Random Access Memory

RGB   Red, green and blue, the three colors used to display images on a computer monitor.

Scanner   Item of hardware used to digitize images, with types available for use with prints, slides and negatives.

Sharpening   Sharpening is the process used by a plug-in filter to increase the apparent sharpness in a digital image.

SmartMedia   One of a number of removable and reusable 'digital film' cards.

Shutter Speed   Cameras can vary the amount of time that the lens allows light to reach the CCD. This exposure time is governed by the shutter speed.

TIFF   Tagged Image File Format, a popular and high-quality file format.

Upload   Sending files to a remote computer, often to go on a website, and generally using a modem.

Wide-angle   Lens focal length which takes in a wider view of the scene.

Zip Removable disk/drive storage system. Disks with two storage capacities are available – 100 Mb and 250 Mb.

Zoom Lens on which the focal length can be varied.