RFID Script

Slide 1

Just-in-Time: Internet Based Curriculum Enhancement is a teaching aid for both the marketing education and the business teacher. Radio Frequency ID, or RFID, is the feature topic of this presentation.

Slides 2 and 3:

In reviewing the content of this professional development module it may be helpful for you to use the following tools to take notes, summarize key points and identify ideas to implement in your classroom:

Cornell Notes Sheet Example - Sample Cornell Notes Sheet that demonstrates how to take notes, summarize key points, and identify specific ideas for implementation.

Cornell Notes Sheet Blank Form - Blank Cornell Notes Sheet for use in taking notes, summarizing key points, and identifying specific ideas for implementation.

Mind Map Example - Example of how to use a mind map to take notes, summarize key points, and identify specific ideas for implementation.

Mind Map Blank Form - Blank Mind Map for use in taking notes, summarizing key points, and identifying specific ideas for implementation.

Professional Development Action Plan - Form to use in taking ideas for implementation from the professional development module (from Cornell Notes Sheet and/or Mind Map(and planning to implement them in your classroom.

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The objectives of this presentation are:

To provide teachers/instructors with up-to-date information about the latests technology in distribution, logistics and inventory control.

To provide information on RFID (radio frequency identification), its current use in manufacturing and retailing to track goods, its current use in other industries, and identify future expanded uses of RFID.

To provide an alternative teaching aid to supplement current classroom textbooks.

To provide a list of current internet resources related to RFID.

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On April 30, 2004, Wal-Mart launched its initial implementation in the North Texas area with 8 suppliers shipping to the Sanger, Texas distribution center. The primary benefit of RFID to customers was to be in merchandise availability by doing a better job of having the right goods at the right place at the right time while improving the customer shopping experience.

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Cases and pallets of 21 different products with the new RFID technology were shipped to the Sanger distribution center, and then sent onward to seven local Wal-Mart Supercenters with radio frequency identification or RFID tags attached. The purpose of the tags was to allow retailers greater visibility in monitoring product inventory to distribution to retailer to consumer. The plan was to have 100 suppliers in place by January 2005. According to Gregory Johnston,VP at Sam's, between the years 2008 and 2010 over 700 suppliers will have their products tagged at Sam's Wholesale Clubs.

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RFID is a generic term for technologies that use radio waves to automatically ID people or objects by having microchips with antennas attached to make up a RFID tag. Most tags contain at least 2 parts: an integrated circuit for storing and processing information and an antenna for receiving and transmitting a signal.

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RFID tags have tiny microchips with an interrogator and a reader which are on a reader. Each RFID reader sends out electromagnetic waves which are picked up by RFID readers. The antenna is tuned to a RFID frequency to receive the waves and then convert the waves into digital data.

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There are 3 general types of tags. The first type is the Passive Tag. Passive tags have no internal power supply and the read distance range is only a few inches. The devices

are normally small, sometimes as small as a grain of rice. One big advantage of this tag is that the shelf life is almost 20 years.

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Active Tags have an internal power source that is used to broadcast their signal which is good and bad. It gives them a longer distance (up to 100 feet or more in range but it limits the shelf life (possibly 10 years) because it cannot operate without battery power). They are usually more reliable than the passive tag and are more effective in water and metal. Obviously, they are more expensive costing almost $20 per tag compared to 20 cents for a passive tag.

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Thirdly, there are semi-Passive Tags also have their own power source, but the battery only powers the micro-chip and does not broadcast a signal. Radio-frequency is reflected back to the reader like the passive tag. Semi-passive tags are typically 100 times more sensitive than passive tags and have an increase range by a factor of 10. Semi-passive tags also have a longer shelf life than active tags and perform some active functions, even when no reader is present.

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Most typical tags have the following elements:

- No more than 2KB of data
- Basic data about the item it is on
- They are a simple license plate with about a 96 bit serial number
- Tags are cheap to manufacture
- Tags are disposed of with product packaging

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Looking at the cost of RFID is difficult because cost depends on individual application, the size of the installation and the type of system installed, as well as many other factors that have to be considered. Typically, readers cost a minimum of $1000 each and companies normally need thousands for all their factories, warehouses and stores. RFID tags have dropped from 75 cents per label in 2004 to 15 cents per label in 2008; but, again, prices vary depending on quantity. Another factor to consider is the practicality of putting tags on millions of items that cost only a few dollars.

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As RFID technology becomes more advanced and more companies and suppliers are buying into the idea, the cost of readers and tags is coming down and several vendors are now beginning to emerge. Impinj and Motorola are two of the leading vendors in this area.

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Twenty-five years ago the bar code revolutionized the retailing industry and today the EPC, or Electronic Product Code, may be the successor of the bar code or UPC. Some of the limitations that may shorten the life of the bar code are:

- A scanner needs to see the bar code to read it
- The bar code can be torn or become soiled and fall off
- The bar code only identifies the product and manufacturer and not the unique item or specific item
- The bar code is unable to detect expiration dates on products

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The purpose of the Electronic Product Code was to create a low cost method of tracking goods using RFID technology. The benefits of the EPC are:

- Items do not require line of site for goods to be scanned
- Tags are designed to identify the manufacturer, the product/sku, along with a serial number that is unique to each item

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The EPC was created by the Auto-IC Center and is being touted at the next generation of the UPC. Where the UPC symbol identifies a make or model, the EPC assigns a specific number to the individual item so that you can identify can number 102 from can number 1,042. Each EPC label will tell when and where the item was made, where it was shipped and its exact location in the supply chain.

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The big deal about RFID has to be the benefits to the consumer and to the retailer. In the first year that Wal-Mart implemented RFID technology, they were able to reduce

out-of-stock by 30%, reduce labor costs, simplify business processes and reduce inventory inaccuracies.

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In the first 6 months that Boeing implemented RFID technology, they were able to reduce maintenance and inventory costs on their Boeing 787 Dreamliner, saving $29,000 in labor costs alone.

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Fashion and RFID technology is also coming of age. Galleria, Kaufhof, a division of Metro Group in Essen, Germany, launched RFID based shopping services for customers on the Third Floor of their men's department store September 20, 2007. The entire floor, all 6,651 sq. ft., is enjoying RFID technology and enabling customers to use the technology that had previously been available for demonstration only.

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39,000 articles of clothing now have hangtags embedded with EPC Gen2RFID labels and approximately 60 RFID interrogators, with more than 100 antennas, to capture data from the labels. This allows the store to analyze data that shows which garments were tried on together and if these combinations were actually purchased. It will also observe the impact of positioning and presentation of goods on the sales floor. Do racks of clothes near the escalator sell better and which racks are being overlooked by shoppers?

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Using a flat screen and RFID technology in the dressing room, customers can find proper sizes quickly to find out if clothing in his size and color is available without having ot dig through racks or shelves. The screen also displays product information regarding material, price, and care instructions.

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Smart mirrors are being placed in dressing rooms to aid the customer in providing product information. The mirrors/displays will also make suggestions regarding apparel coordination of the garment(s) that you are trying on in the dressing room.

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Another use of smart mirrors and web cams is called “social retailing”. Popular in Europe, customers walk into dressing rooms and a “smart mirror” will reflect your image as well as celebrity images wearing the same item of apparel. A webcam projects this image on the website for everyone to view, creating an interaction between the consumer and their social network outside the store. The RFID antenna in the dressing room and EPC RFID tags on apparel items enables the smart mirrors and webcams to communicate.

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Additional consumer uses are just beginning to “Surface”. AT&T and Microsoft have paired up to show off Microsoft’s new 30” table-like display called “Surface”. Demonstrations are available in New York, Atlanta, San Antonio, and San Francisco beginning in April 2008. If all goes well, expect to see Surface in all 2,200 AT&T stores in the U.S. According to Robbie Bach, President of the Entertainment and Devices Division of Microsoft, “Surface transforms the retail environment from a transaction destination to a customer engagement destination.” Checkout their website for more information : www.surface.com

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The FDA has approved two new uses of RFID technology that are both a little controversial. The use of human implants will have both personal safety and privacy concerns, and it will be interesting to see how the consumer market will receive this technology. Clinical trials are being conducted on the use of surgical sponges with RFID technology and, while a fascinating idea, one of the biggest challenges is to get the tag to read through a body with bone, muscle and flesh, and how to get an accurate read every time. Of courses the sponges have to be disposed of every time. So, the bigger questions remains: does this make economic sense?

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Texas Instruments is developing equipment for recycling trucks to be outfitted with scales and RFID readers. The truck would scan the tag in your recycle bin to track how much the consumer is recycling each month, and consumer/household would be rewarded each month with coupons or prizes based on how much they recycled. This program is already in place in Pennsylvania and Massachusetts.

Curves Fitness Center is also making use of RFID technology by having wristbands that customers can flash over a scanner on the machine to read the workout program and get real-time feedback on whether she is meeting her goals for that station. At the end

of her half-hour the woman scans her wristband on a reader at the desktop computer to get a graphical display of how well she did overall on targeted muscle groups, reps completed and calories burned.

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Toll tags, or auto pass tags, have been used in Europe since the mid-1990's and have been used in the United States since early 2000. Public toll roads equipped with RFID payment systems typically use active tags which read numbers in vehicles as they pass through toll booths. Tag information is used to debit fees from a prepaid credit account.

In mass transit, a passive card would be used on public transportation such as buses or trains in a static or unchanging situation; whereas, an active card would be used in crowded downtown areas with variable tolls.

Slides 29 and 30:

The phrase "Internet of Things" was coined in 2005 and is used to describe technology connecting with physical objects. Some examples of connecting the physical world with the internet's virtual world are: refrigerators exchanging information with supermarket shelves or laundry machines with clothing. BMW is leading the way in the automobile industry in researching how to build a system that connects home servers, data, music, information, and a navigation system that adapts to a mobile phone, car, home PC, and more. Check out the International Telecommunications Union website for more information: www.itu.int/itunews/manager/display.asp?lang=en&year=2005&issue=09.

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For additional resources check out the reference file that is attached to this PowerPoint presentation for a complete list of all websites used in this presentation, as well as additional sources related to RFID. Also check out the Vocabulary File attached to this presentation for a helpful list of vocabulary terms and phrases associated with RFID.

RFID Glossary

Active Tags

Tags that use batteries as a partial or complete source of power to boost the effective operating range of the tag, and to offer additional features over passive tags, such as temporary sensing.

Alignment

The orientation of the tag in relationship to the reader.

Antenna

A device that conducts electromagnetic energy. In RFID, an antenna radiates energy in the radio frequency spectrum to and from the RFID tag.

Bar Code

A standard method of identifying items based on lines of varying widths and spacings that are visually read by a scanner. The UPC bar code standard provides a way of identifying manufacturers and product categories. Other types of bar codes are used for shipping and other kinds of identification. See Universal Product Code (UPC)

Bidirectional

In RFID, a tag that can be read or written from either side.

High Frequency Tags

RFID systems that operate at 13.56 MHz with a typical maximum read range of up to 3 feet (1 meter).

Data Transfer Rate

The rate at which data is transferred between the reader and a tag, generally measured in bits per second (bps).

Electronic Product (EPC)

An identification standard created by the Auto-ID Center that provides additional information to existing bar codes. The EPC can identify manufacturers, product categories, and individual items. (See Bar Codes)

License Plates

A term that denotes a simple RFID technique that carries only a serial number on tags. This serial number is associated with information in a database.

Low Frequency Tags

RFID systems that operate at about 125 kHz with a typical maximum read range of up to 20 inches (508mm).

Nominal

The optimal level of operation for a system.

Nominal Range

The range at which a system can operate reliably under normal conditions.

Orientation

Placement of a tag in relationship to the reader or scanner.

Passive Tags

The most common RFID tags in which a reader transmits an energy field that “wakes up” the tag and provides the power for the tag to operate.

Penetration

Refers to the ability of a particular radio frequency to pass through packaging and other materials.

Radio Frequency Identification (RFID)

A method of transmitting information using radio waves. RFID systems consist of a tag that contains information indentifying an item or specifying a condition or state. A reader communicates with the tag and reads the information programmed into its memory.

Range

The distance at which a tag can be successfully read or written to by the reader.

Reader

The device that retrieves information from tags using radio waves. Readers generally receive data from tags and transmit data to host computers or peripheral devices, such as a printer.

Tag

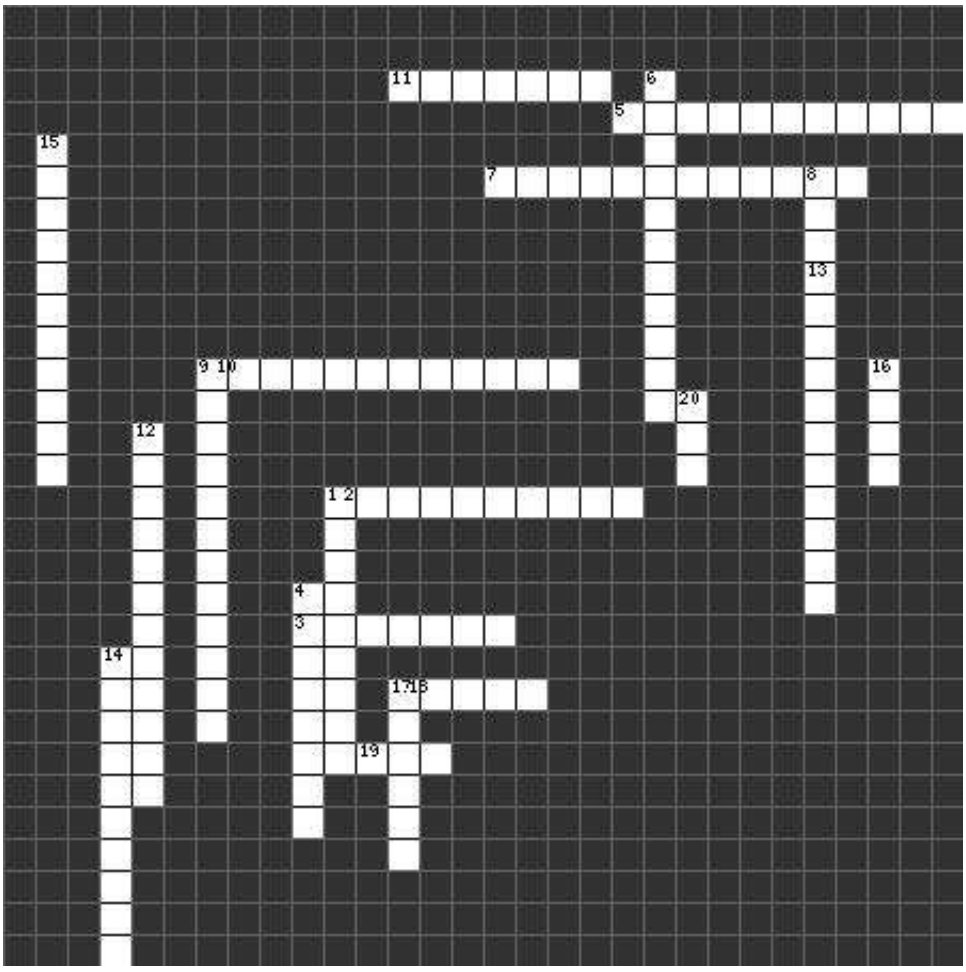
A combination of a microchip and antenna that can be programmed with information to identify items and transmit that information to a receiver. Some tags can also receive new information such as location information during shipment.

Universal Product Code (UPC)

The barcode standard used in North America.

RFID

Date :_____ Name :_____



1 uses batteries as source of power

2 orientation of tag in relationship to reader

3 device conducts electromagnetic energy

4 standard method of identifying items

5 In RFID a tag can be read or written from either side

6 Tag with a typical maximum read range up to 3 feet

7 Rate at which data are transferred between reader and tag

8 ID Standard created by Auto-ID Center

9 A simple RFID technique that carries only a serial number

10 Tag with a typical maximum read range of up to 20 inches

11 Optimal level of operation for a system

12 Normal range a system can operate reliably

13 Placement of a tag in relationship to the reader or scanner

14 Most common RFID tag

15 Ability of a particular radio frequency to pass through packaging

16 Method of transmitting information using radio waves

17 Distance at which a tag can be successfully read or written by the reader

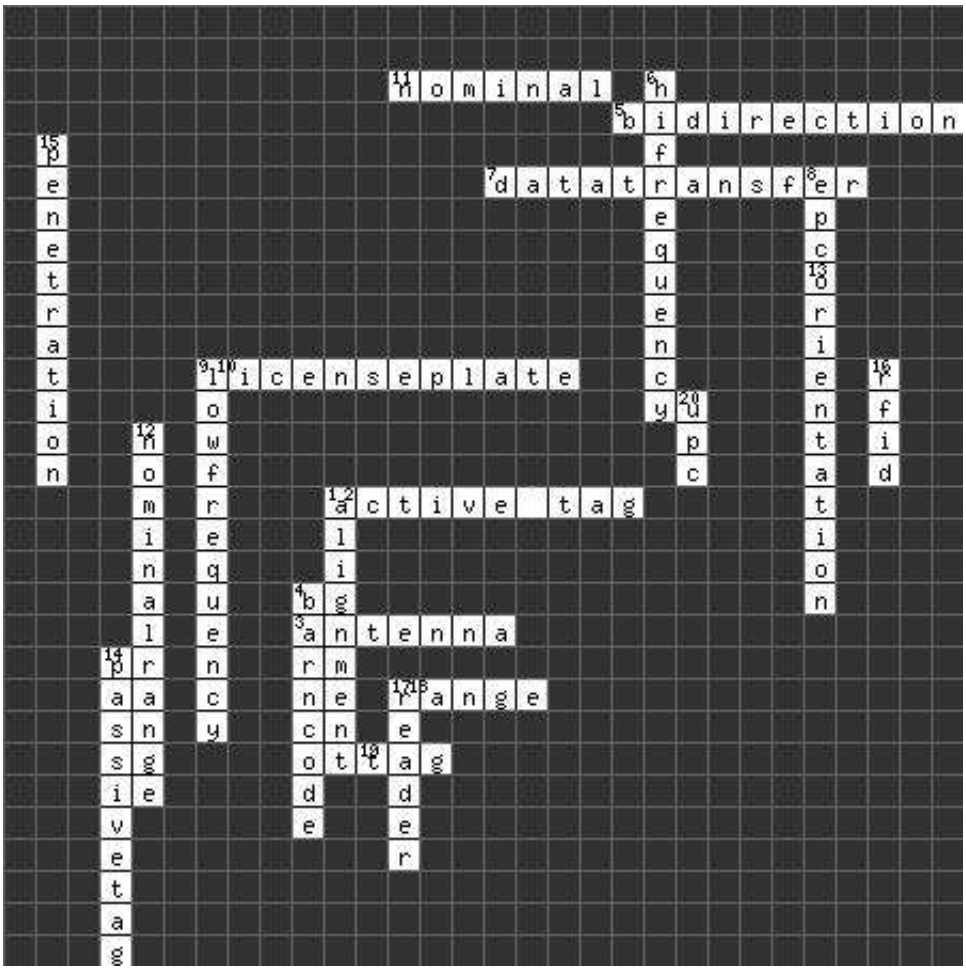
18 Device that retrieves information from tags using radio waves

19 Combination of microchip and antenna

20 Barcode standard used in North America

RFID

Date :_____ Name :_____



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