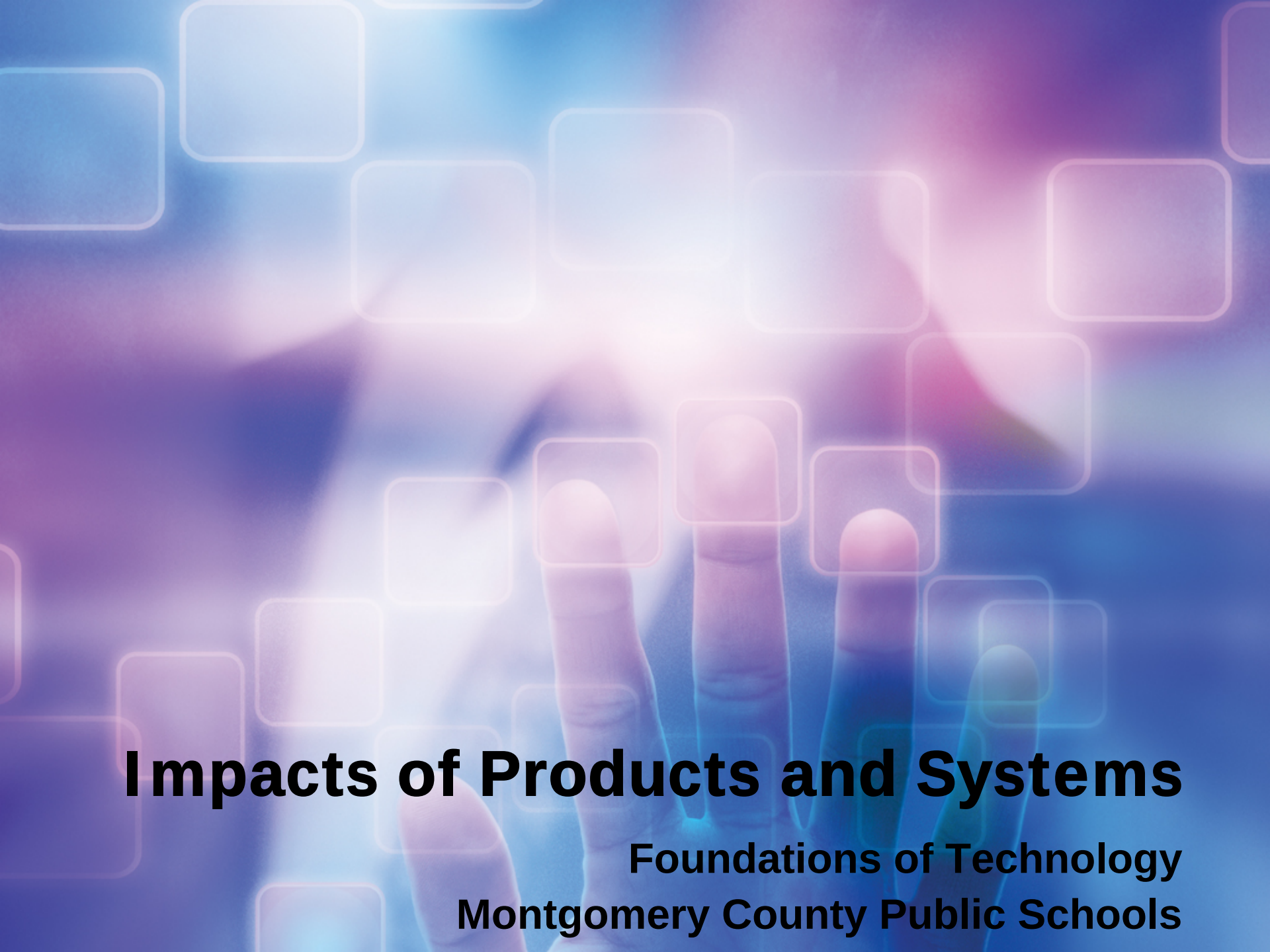

Impacts of Products and Systems

Foundations of Technology

Montgomery County Public Schools

Outcomes

In this presentation, you will learn to…

- Collect information and evaluate its quality (ITEA 13-J)
- Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment (ITEA 13-K)
- Use assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology (ITEA 13-L)
- Design forecasting techniques to evaluate the results of altering natural systems. (ITEA 13-M)

Collecting and Evaluating Information

This presentation is about collecting and evaluating information for quality, drawing conclusions, and assessment and forecasting techniques. By learning how to access technology, you will become better citizens in the future and, as a result, you will be able to make wiser decisions in an increasingly complex technological world.

Information is vital to taking an active part in society. It provides a concrete foundation for decision making and action. Information can be as simple as the serving time for lunch. It can be as complex as the moon's effect on the tides. Evaluating the authority, usefulness, and reliability of information is essential.

In contrast to other living species, humans have the ability to think, reason, and enter into articulate speech. They therefore can observe what is happening around them, make judgments about those observations and explain them to other people.

Data and Information

This unique ability requires knowledge, which is derived from data and information. **Data** are the raw facts and figures that are collected by people and machines such as computers. **Information** is data that has been sorted and categorized for human use.

Everywhere we turn we encounter facts and figures that are called data. When we organize this data and group it according to its type, we create information. Information is essential for operating all technological systems.

Example: Data and Information

An example will show the difference between data and information. You might measure the size and weight of everything you can find. This would be data because it is random and assorted.

If you sort the data so the height and weight of all people are grouped together, however, you have information, that is, organized data. Note also that from this information you can see relationships and draw conclusions, for example that adults are generally taller than children and men are generally taller than women.

With this final step you have developed knowledge. **Knowledge** is people using information to understand, interpret, or describe a specific situation or series of events.

Information: Three Types

Data processing involves collecting, categorizing, and presenting data so that humans can interpret it. We can group information into three areas:

- **Scientific information**
- **Technological information**
- **Humanities information**

Scientific Information

Scientific information is organized data about the laws and natural phenomena in the universe. Scientific information describes the natural world.

The natural world

Technological Information

Technological information is organized data about the design, production, operation, maintenance, and service of human-made products and structures. Technological information describes the human-made world.

The human-made world

Humanities Information

Humanities information is organized data about the values and actions of individuals and society. Humanities information describes how people interact with society and the values held by individuals and groups of people.

diverse world

Knowledge

Information that is learned and applied by people is called **knowledge**. It is the result of reasoned human action. Knowledge guides people as they determine which course of action to take.

Although knowledge can be described in terms of being derived from scientific, technological, or humanities information, in reality all these types of knowledge must be considered on any problem needing a solution.

- Knowledge derived from science might provide a theoretical base for the solution.
- Knowledge derived from technology is used to implement the solution.
- Knowledge derived from the humanities will tell us if the solution is acceptable to society.

Making Informed Decisions

Advantages of technology far outweigh the disadvantages. If it were not for the development of technology, humans would be living in a much more primitive world today. This has come about by collecting and evaluating the information that was available at the time to make good decisions.

Collecting and synthesizing data is invaluable for making informed technological decisions. For example, people who are interested in buying a product or system may design a forecasting instrument and collect data in order to access a technology's efficiency and intended function.

Collecting information and evaluating its quality may include using such methods as comparing and contrasting sources, examining relevancy, and investigating the background of experts

Deductive Thinking

Deductive thinking can help you synthesize data, analyze trends, and draw conclusions regarding the effect of technology on individuals, society, and the environment.

When you look at data and information take into account historical events, global trends, and economic factors, to evaluate and consider how to manage the risks incurred by technological development.

Example: Forecasting Model

An example of an activity would be to research various climate forecast models and project what would occur if the Earth's polar regions warmed by 2°C or 4°C. You could then analyze a plan to address global warming and assess its potential solution.

Once information has been accumulated, synthesized, and used for forecasting, the final step in assessing a product or system is deciding whether using it is appropriate.

In making such a decision, you should come to understand the benefits and risks, costs, the limits and potential, and the positive and negative impacts of technological developments.

Assessment Techniques

Use assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.

Assessment is an evaluation technique involving iterative steps and procedures that requires analyzing trade-offs, estimating risks, and choosing a best course of action. The assessment of a product or system can prove that it is dangerous, but it cannot prove that it is safe.

Design Forecasting Techniques

Design forecasting techniques to evaluate the results of altering natural systems. These techniques should include testing and assessment. These natural systems could be lakes (building homes around the shoreline), rain forest (cutting them down for the wood), or land (strip mining for coal).

Instruments to gather data

Design and use instruments to gather data. Examples of these instruments could be a data-collection instrument for interviews, questionnaires to be mailed, or computer-based forms on the Internet such as Test Pilot or a free online survey site.

Assessment tools could also include devices designed to conduct tests on such things as water quality, air purity, and ground pollution.

Analyze and Interpret Trends

Use data collected to analyze and interpret trends in order to identify the positive and negative effects of technology. Technological literate people are able to fulfill their personal and social responsibility to assess technology.

Identify trends and monitor potential consequences of technological development. Trends are patterns of technological activities that show a tendency or take a general direction. Trends are used to provide direction in deciding if a product or system should be used.

Interpret and evaluate the accuracy of the information obtained and determine if it is useful. Developing specific criteria for what is useful is important in making these judgments.

Determining Accuracy

Sometimes determining accuracy is easy — taking information from physical measuring devices like a water-purity tester, for example. At other times, accuracy is more difficult to determine, as when assessments are based on public opinion, which can differ from group to group and from time to time.

Critical evaluation of information is essential to conducting quality research. With so much information available, in many different formats and from many different sources, each piece of information that you select must be carefully reviewed to ensure the quality, authority, perspective and balance that best supports your research.

Summary

- Forecasting techniques evaluate the results of altering natural systems
- Trends are patterns of activity that show a tendency or general direction
- Evaluating the authority, usefulness, and reliability of information is essential
- Use assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology
- Assessment is an evaluation technique involving iterative steps and procedures that requires analyzing trade-offs, estimating risks, and choosing a best course of action
- Humanities information describes how people interact with society and the values held by individuals and groups of people
- Information that is learned and applied by people is called knowledge
- Collecting and synthesizing data is invaluable for making informed technological decisions
- Data processing involves collecting, categorizing, and presenting data so that humans can interpret it
- Scientific information describes the natural world
- Technological information describes the human-made world
- Data are the raw facts and figures that are collected by people
- Information is data that has been sorted and categorized for human use
- Information is essential for operating all technological systems
- Knowledge is people using information to understand, interpret, or describe a specific situation or series of events