



*Integrating Computer Technology  
into the Classroom  
Using the NTeQ Model*

**Freedom to Learn Workshop  
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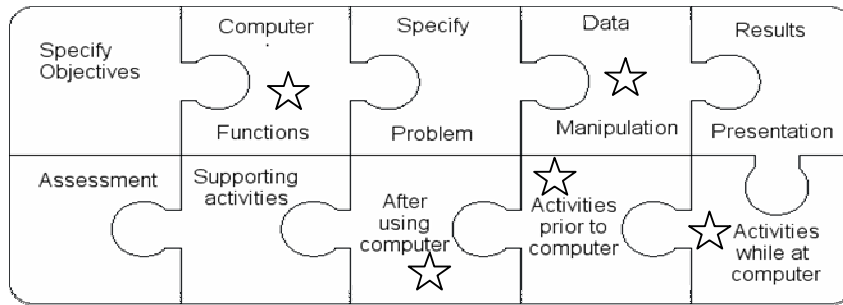


## How Are ~ Technology Integration Lessons Different?

Well-structured lesson plans address what students will be learning (specify objectives), how they will let the teacher know what they have learned (results presentation), how the teacher will evaluate achievement (assessment), and a description of the activities (supporting activities). When the lesson is problem-based, it will also include the problem statement. So, how does a lesson need to be changed to integrate student use of computers?

### The NTeQ 10-Step Lesson Plan

As seen in the NTeQ 10-Step Lesson Plan below, there are five components that are unique to technology integration lessons. Descriptions of those five and the other lesson components are included in the model.



Specify Objectives	Match with Computer Functions	Specify the Problem	Data Manipulation	Results Presentation
Based on national and/or local standards for curriculum and technology use.	Identify verbs from objectives that match with computer functions. Analyze ⇒ Spreadsheet Identify ⇒ Database Design ⇒ Draw	Identify the problem (consider using student input) to solve a problem that is relevant to the students and based on real-world data.	What is the data source? Will students collect and enter the data? Will you provide them with the data? Will they use data from the Internet or a CD-ROM? How will the students manipulate the data - sort, graph, draw, etc.?	How will the students present their findings? Poster, presentation, paper, magazine, web page?
Assessment	Supporting Activities	Activities After Using the Computer	Activities Prior to Using the Computer	Activities while At the Computer
How will you assess student achievement? Rubrics, portfolios, objective tests, projects, etc.	What other activities will be used to support achievement of all the objectives? Reading, practice, small group discussions, manipulatives, etc.	What will the students do with the information they generated/ obtained while using a computer? Analyze their results, prepare a report, etc.	What tasks must the students complete before they use a computer, e.g., identify search terms, organize data, outline a report, prepare a rough sketch?	What will the students do while at a computer? Enter data, write a report, create a graph, etc.

# Computer Functions

## Spreadsheet

- Convert**
- Modify**
- Analyze**
- Calculate**
- Compare or contrast**
- Estimate**
- Predict**

## Database

- Organize**
- Analyze**
- Arrange or sort**
- Select**
- Categorize**
- Choose**
- Select**

## Word processor

- Modify/Change**
- Edit**
- Differentiate**
- Outline**
- Paraphrase**
- Create**
- Punctuate**
- Report/Write**

## Drawing

- Design**
- Plan**
- Diagram**
- Communicate**

## Email

- Collaborate**
- Communicate**
- Contribute**

## Browser

- Research**
- Gather data**
- Publish**
- Search**
- Find**

## How to ~

### Know When to Use Computers

**The NTeQ 10-Step Lesson Plan provides guidance for creating technology integration lessons, but does not really tell you when it is appropriate to have students use computers or which type of computer use would be the most appropriate. The following chart describes the basic functions of each type of software tool and general suggestions for when to use the software.**

Software	Functions	When to Use
Word Processing	<ul style="list-style-type: none"> <li>▪ Edit and format text</li> <li>▪ Create Outlines</li> <li>▪ Create Columns</li> <li>▪ Generate Tables</li> <li>▪ Insert Graphics</li> </ul>	Use with information that can be paraphrased and/or organized in meaningful ways.
Spreadsheet	<ul style="list-style-type: none"> <li>▪ Perform Calculations</li> <li>▪ Sort Data</li> <li>▪ Create Graphs/Charts</li> </ul>	Use with sets of numbers that have repetitive patterns that can be described with at least two variables (Row & Column).
Database	<ul style="list-style-type: none"> <li>▪ Store data in records</li> <li>▪ Sort data (alpha or numeric)</li> <li>▪ Match data</li> <li>▪ Merge data</li> <li>▪ Create specialized reports</li> </ul>	Use with information that has repetitive patterns and can be easily described.
Browser	<ul style="list-style-type: none"> <li>▪ Searches by Key Words</li> <li>▪ Bookmarks web sites</li> <li>▪ HyperLinks to text, virtual tours, etc.</li> <li>▪ Provides Interactive Feedback</li> </ul>	Use to access information or to engage in interactive learning.
Communication	<ul style="list-style-type: none"> <li>▪ Allows synchronous /asynchronous communications</li> <li>▪ Sends/Receives Text</li> <li>▪ Sends/Receives Video/Audio</li> <li>▪ Sends/Receives Attachments</li> <li>▪ Archives Messages</li> </ul>	Use when interactivity with others will enhance learning
Concept Mapping	<ul style="list-style-type: none"> <li>▪ Connects ideas</li> <li>▪ Creates sequences</li> <li>▪ Adds Graphics</li> </ul>	Use with content that can be categorized, linked, or contrasted.
Presentation	<ul style="list-style-type: none"> <li>▪ Displays Text</li> <li>▪ Supports Navigation</li> <li>▪ Creates Animation</li> <li>▪ Inserts or Creates Graphics</li> <li>▪ Inserts Video</li> <li>▪ Inserts Sound</li> </ul>	Use to display information that can be enhanced by interactivity

# Classroom Ideas ~

## Word Processing

Below are examples of how students can use word processing as a tool to better learn subject area content. Also included is space for you to add ideas for your students to use word processing.

STUDENT Word Processing Activities	My Ideas for Student Use of Word Processing
<ul style="list-style-type: none"> <li>• Create a “vocabulary word” table that includes a graphic for each word and a description of why it represents the word.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Download a CNN editorial and replace the adjectives with ones that have a similar meaning.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Rewrite the Bill of Rights to a level that is more easily understood by 2<sup>nd</sup> grade students.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Download a picture of the Statue of Liberty and create a list of 50 words that describe its features.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Locate clipart of two birds that are very different, and then write a paragraph that highlights those differences.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Use weather data from the Internet to create the “Window on Weather” section of the school newspaper.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Compose a letter to the Mayor regarding the poor air quality of your neighborhood. Include digital photos to support your argument.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Write a one page story that predicts what life in the United States will be like in 75 years.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Use the “Track Changes” Tool to suggest edits on your partner’s report.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Use a different color text to add your part of a “chain” story written by students in your group.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Choose three graphics that represent key features of the main character in today’s story and describe why you chose each one.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Use the “Highlight” tool to mark each noun yellow and each verb blue.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Lower the reading level of the 1<sup>st</sup> paragraph of Abraham Lincoln’s presidential acceptance speech by using different adjectives and adverbs.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

# Classroom Ideas ~

## Spreadsheets

**Below are examples of how students can use spreadsheets as a tool to better learn subject area content. Also included is space for you to add ideas for your students to use spreadsheets.**

STUDENT Spreadsheet Activities	My Ideas for Student Use of Spreadsheets
➤ Plot average yearly precipitation in your county for the past 50 years.	•
➤ Compare miles traveled during migration for 10 different birds.	•
➤ Compare the number of adjectives and adverbs used in the first 300 words of a non-fiction book and a fiction book.	•
➤ Compare the number of U.S. vs. Asian yearly earthquake occurrences for the past 50 years.	•
➤ Compare grams of sugar in breakfast cereals.	•
➤ Calculate the maximum price per square yard that could be paid, if the PTA gave your class \$300 to carpet your classroom.	•
➤ Determine the shortest driving route from New York City to San Antonio, Texas.	•
➤ Determine the number of dump trucks needed to transport soil removed for a competition-sized swimming pool.	•
➤ Create a budget that would result in at least \$100 profit from selling hot dogs at \$1.00 each.	•
➤ Graph the cost differences between using natural gas vs. electricity for heating a home.	•
• Use data to demonstrate whether or not the environmental protection efforts are working.	•
• How much time would the “Hare” have to waste for the tortoise to win a 1-mile race?	•
• Plot the yield per acre for grain crops grown in the Midwest.	•

# Classroom Ideas ~

## Databases

**The following list contains suggestions for databases that can be created by elementary, middle, and/or high school students. Numerous problem statements can be generated from each database.**

STUDENT Database Suggestions	My Ideas for Student Use of Databases
<ul style="list-style-type: none"> <li>• Digestive systems of organisms –from bacteria to mammals.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Experimental approaches of famous scientists, e.g., Edison, Watt, Bell.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Dinosaur characteristics</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Genetic traits of students</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Features of U.S. state flags</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Government structures of different countries</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Features of the tallest mountains</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Similarities of fairy tales, e.g., setting, theme, characters</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• U.S. Wars</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Shapes around us</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Female authors of the 1800's</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Parts of speech examples</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Real world examples of fractions</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Nutrients of common food</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Governors from our state</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

# Classroom Ideas ~

## Concept Maps

STUDENT Concept Activities	My Ideas for Student Use of Concept Maps
Compare and/or Contrast	•
• Pilgrims vs. Native Americans	•
• Matisse vs. Monet	•
• Oceans vs. Seas	•
• Farm life vs. City life	•
• Plant cells vs. Animal cells	•
• City vs. State vs. National Government	•
Create a Time-Line	•
➤ Seed to Plant	•
➤ Sunlight to Food	•
➤ Your Life	•
➤ Civil Rights in the U.S.	•
➤ Space Program	•
➤ Rise and Fall of Dinosaurs	•
Plot Main Ideas	•
• Four seasons	•
• Punctuation	•
• Money	•

# Classroom Ideas ~

## Presentations

**The following list contains suggestions for presentations that can be created by elementary, middle, and/or high school students. Space is provided for you to add ideas for how your students can create presentations.**

STUDENT Presentation Activities	My Ideas for Student Use of Presentations
Graphically depict the parts of speech	•
Use graphics to demonstrate different types of symmetry	•
Showcase items of interest within 100 miles of our school	•
Demonstrate the before and after of key chemical reactions	•
Illustrate the difference between electrical vs. chemical energy	•
Create a virtual elevator ride to the Earth's center	•
Illustrate Prepositions in Action	•
Document the history of money	•
Explain why it rains	•
Showcase postcards from Asia	•
Depict math concepts in motion	•
Compare the role of antennas	•
Create a "Countries of our Heritage" for our class	•
Show tessellations through time	•
Visualize what happens to a vote	•

# Classroom Ideas ~

## Web Browsers

**Below are examples of how students can use web browsers as a tool to better learn subject area content. Also included is space for you to add additional ideas for your students to use web browsers.**

STUDENT Web Browser Suggestions	More Ideas for Student Use of Web Browsers
Historical Documents	•
• Books – e.g., Complete Works of Shakespeare	•
• Documents – e.g., U.S. Constitution	•
• Video – e.g., Martin Luther King – "I have a	•
• Audio - e.g., Robert Frost reading poetry	•
Current Events	•
• News	•
• Human Interest stories	•
• Sports	•
• Science and Technology	•
• Foreign Relations	•
Reference and resources tools:	•
• Dictionaries	•
• Thesaurus	•
• Encyclopedias	•
• Calculators - e.g., graphing, interest	•
• Statistics - e.g., census, employment,	•
Interactive Learning	•
• Basic skills drill and practice	•
• Problem-solving	•
• Virtual reality	•

## Classroom Ideas ~ Communication Tools

STUDENT Communication Tools Suggested Participants	More Ideas for Student Use of Communication Tools
Other Students	▪
Same class	▪
Same school	▪
Same city	▪
Same state	▪
United States	▪
International	▪
Experts	▪
Researchers – e.g., professors, scientists	▪
Business – e.g., architects, engineers, accountants	▪
Government – e.g., local, state, national, international	▪
Medical – e.g., doctors nurses, pharmacists, technicians	▪
Writers – e.g., newspaper, books, poets	▪
Artists – e.g., musicians, painters, sculptors	▪

## RESOURCES FOR INTEGRATING TECHNOLOGY INTO YOUR CURRICULUM

Berrien County ISD: contains links to many resources, including online classes for teachers, search engines, lesson plans, online encyclopedias, and much more.

<http://www.remc11.k12.mi.us/bcisd/classres>

This matrix has links for web quests for grades K - 12, divided into 11 subjects areas.

<http://webquest.org/matrix3.php>

Microsoft's website has links to online job aids for all Microsoft products. There are also many lesson plan ideas for all grades and subject areas.

<http://www.microsoft.com>

The CREATE for Mississippi Project is similar to Michigan's FTL program. Their site has links to hundreds of technology-integrated lessons in all subjects and at all grade levels. These are complete with resources, handouts, and assessment rubrics.

<http://www.create4ms.org/>

This site has links to lessons using World Wide Web resources for inquiry based instructional activities. These web quests were designed by Missouri teachers and are geared for grades 3-5, and middle school. Links to additional online resources are also provided.

<http://www.emints.org/webquest/index.shtml>

*Integrating Computer Technology into the Classroom*, by Gary R. Morrison and Deborah L. Lowther <http://tinyurl.com/6mrqj> Morrison & Lowther's book gives all the information you could ever need about integrating technology into your curriculum.

The Freedom to Learn program urges teachers to use the NTeQ model of instruction to integrate technology through inquiry. Their website has more information.

<http://www.nteq.com/>

To build your own easy, free online lesson, try this site. You can create web quests, subject samplers, treasure hunts, hot lists, scrapbooks, and more with the easy to use, fill-in-the-blank tools.

<http://www.kn.pacbell.com/wired/fil/index.html>

To search the database at National Technology Education Standards, try

[http://cnets.iste.org/search/s\\_search.html](http://cnets.iste.org/search/s_search.html)

Science Netlinks searchable lesson plans:

<http://www.sciencenetlinks.com/matrix.cfm>

Academy Curricular Exchange for Science Grades 9-12

<http://ofcn.org/cyber.serv/academy/ace/sci/highhtml>

Principles & Standard for School Mathematics

<http://standards.nctm.org/>

A Support Forum for K-12 Technology Leaders

<http://www.thesnorkel.org/>

The Biology Place

[http://www.phschool.com/science/biology\\_place/](http://www.phschool.com/science/biology_place/)

Web Teacher: Your Source for Web Knowledge

<http://www.webteacher.org/home-windows/index.html>