

Contextualized Curriculum

for Adult Learners in Math and Literacy

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Figuring Out the Problem

Print:   

IT [Troubleshooting](#): Locating the right solution to IT issues

Industry Sector: [Information Technology](#)

Content Area: [Literacy](#)

Core Topic: [Reading technical information](#)

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Common Core State Standards

RST.11-12.3: Follow precisely a complex multistep [procedure](#) when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

RST.11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

RST.11-12.10: By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

Adult Basic Education Standards

Reading Standard 1: Learners will comprehend and analyze a variety of texts for various purposes.

R1.2a: Extract critical information from adapted formatted texts (e.g. forms, labels, maps, schedules).

R1.3a: Identify critical information in formatted texts (e.g. forms, timelines, tables, maps, calendars, advertisements, charts, graphs).

R1.3b: Locate critical information in functional prose of increasing length and complexity of content (e.g. invitations, bulletins).

R1.4a: Distinguish between fact and opinion, fact and fiction, relevant and irrelevant information.

R1.4f: Draw conclusions and make predictions and inferences from information or ideas presented in texts of various genres (e.g. historical documents, newspaper and magazine articles, fiction and non-fiction, job-related materials).

R1.5a: Determine the tone (feeling that the writer is trying to convey) of a variety of writing samples (e.g. editorials, magazine articles, literary texts).

R1.5b: Evaluate the persuasiveness of a text on the basis of the quality of evidence provided to support its argument.

Reading Standard 2: Learners will acquire skills and vocabulary for reading and comprehending written text.

- **R2.3b:** Recognize intermediate function words (e.g. pronouns, prepositions, conjunctions, auxiliary verbs).

Industry Overview

From computer programmers to [web developers](#), and from network administrators to technical support specialists caring for the IT infrastructure, there are information technology (IT) careers available in every sector of the economy. While some people in this field work for IT companies, IT skills and services are needed in fields as wide-ranging as financial services, medical services, biotechnology, engineering and environmental services¹. The IT industry designs, develops, manages and supports the hardware, software, multimedia and networks we depend on in our daily lives and businesses. IT has revolutionized our world—from the ways we communicate to how we find information to how businesses operate. Job growth in the US IT industry is high and is projected to continue for many occupations within the industry. The field is constantly growing and changing and there are high levels of competition which makes it important for IT workers to keep updating their skills and to understand the latest technologies.

Careers in Information Technology²

Information technology careers are divided into four pathways: Network Systems, Information Support and Services, Programming and Software Development, and Web and Digital Communications.

Careers in Network Systems involve network analysis, planning and implementation, including design, installation, maintenance and management of network systems. Examples of network systems occupations include: network administrator, network technician, PC support specialist, telecommunications network technician, data communications analyst, and security administrator.

Careers in Information Support and Services involve IT deployment, including implementing computer systems and software, providing technical assistance, and managing information systems. Successful IT deployment is critical to the success of most organizations—the management and sharing of information depends on non-IT workers having functional computers, software and databases that meet their needs, and support when things aren't working. Information systems and support occupations include [database](#) administrator, enterprise systems engineer, help desk specialist, technical support specialist, and technical writer.

Careers in Programming and Software Development involve the design, development, implementation and maintenance of computer systems and software and require knowledge of computer operating systems, programming languages and software development. While many of the career opportunities in this area are in software companies, large organizations of other types—such as financial services—also offer many opportunities. Programming and software development careers include: software applications architect, operating systems designer/engineer, computer programmer, video game developer, applications engineer, and applications developer.

Careers in Web and Digital Communications involve creating, designing and producing interactive multimedia and social media products and services and include development of digitally-generated or computer-enhanced media used in business, training, entertainment, communications and marketing.

Organizations of all types and sizes use digital media (such as the Internet and social media platforms) to communicate with existing and potential customers, to track transactions, and to collaborate with colleagues. Occupations in this pathway include web designer, webmaster, 3D animator, virtual reality specialist, and multimedia producer.

Mathematics and Literacy Skills Needed in Information Technology

The complexity of the IT industry, including the rapid pace of change in technology, requires workers to continuously upgrade their skills. Jobs in this industry require good problem-solving, critical-thinking, and reasoning; clear and professional communication; and a strong background in mathematics. Thus, in addition to technical skills specific to each job, mathematics and literacy skills are crucial for success in all occupations across the industry. Literacy is essential in this field as it is heavily dependent on written and oral communication, and workers need to be able to read, understand, and implement highly-technical content. Workers in this industry must communicate with clients, colleagues, and other departments and staff, including executives.

Regardless of how technologies change, a strong foundation in mathematics, particularly with such core areas as mathematical operations and number sense, measurement and estimation, ratios and proportions, and data analysis is very useful in this industry. For example, programmers and developers must be able to employ quick and competent computation and have the ability to select and apply the best mathematical model or formula to solve problem at hand.

Career Opportunities in IT with Education from Community Colleges

Massachusetts Community Colleges play a crucial role in preparing students for careers in IT across all sectors of the industry. The fifteen community colleges offer associate degree and certificate programs that prepare students to enter occupations across all sectors of the industry, from network administrators to technical support specialists to computer programmers to Web designers. For example, [Cape Cod Community College's Department of Business](#) has an IT program that prepares students for a range of positions through both the Information Technology A.S. degree and certifications that offer skills in specific concentrations in this field, such as networking and web design.

Recent Career Opportunities in Massachusetts

The following is a sample of IT job listings in Massachusetts that require associate's degree or certificate:

- Help Desk Technician [[show](#)]
- PC Technician [[show](#)]

The following is information about hires of recent IT graduates from Massachusetts community colleges:

- [Bristol Community College, Computer information Systems: Computer Networks](#)
- [Mount Wachusett Community College, Computer Information Systems](#)

Employment Outlook for Information Technology

Given the ubiquity of IT in the U.S. and the world today, employment in this industry continues to boom. Even during the current recession, there has continued to be high demand for workers with good technical, problem-solving and critical-thinking, and communication skills in the IT industry. The U.S. Bureau of Labor Statistics reported in its 2012-13 edition of the Occupational Outlook Handbook that employment in the industry is expected to grow "much faster than the average" of all occupations through 2020. Massachusetts has very high levels of employment and numbers of job openings in many IT occupations across the state. In 2011, it was one of the top seven states for employment opportunities in the industry. Furthermore, Middlesex and Suffolk counties were among the top 20 counties nationally listing IT positions.

However, within the IT industry, job growth and openings vary due to technological changes and competition (especially foreign). For example, employment for computer programmers in Massachusetts and nationally continues to be high, but is declining—future jobs will go to people with strong technical, cognitive, intrapersonal, and interpersonal skills. Likewise, lower-skilled jobs such as

computer support specialists will have lower employment growth due to outsourcing (though help desk personnel are always needed in larger firms to assist non-IT staff with maintenance, [troubleshooting](#), and repair). The highest growth areas in IT—nationally and in Massachusetts—are in such occupations as computer and information systems managers, computer systems analysts, and computer specialists.

Resources

Employment Outlook

- [Massachusetts Career Information System](#)
- [U.S. Bureau of Labor Statistics: Occupational Outlook Handbook, Computer and Information Technology](#)
- [Jobs for the Future: An Examination of the Information Technology Job Market \(2012\)](#)

Occupational Information

- [Massachusetts Career Information System](#)
- [U.S. Bureau of Labor Statistics: Occupational Outlook Handbook, Computer and Information Technology](#)
- [WorkKeys Occupational Profiles](#)
- [WorkKeys: Occupations and Key Skills](#)
- [Information Technology Career Clusters](#)
- [Information Technology Career Frames](#)

¹<http://www2.edc.org/ewit/materials/ITCCBRO.pdf>

²As cited in <http://www2.edc.org/ewit/materials/ITCCBRO.pdf>

Workplace Scenario (8th Grade Level)

This scenario is based on the work of a Tier I Help Desk staff member. For more information, view [this video](#).

You are a Tier I, or first level, Help Desk staff member in the Information Technology (IT) department at the headquarters of a large [retail](#) company. You are assigned to answer requests for computer technical support from the company's employees. These requests come in either by email or phone. Your job is to provide the first response to the customer about issues. One of your jobs is to solve small IT problems. You must also track the service records related to each problem you solve.

When you receive a request for technical support, you open a new [ticket](#) in the department's computer [database](#). An IT [database](#) is a collection of data about technical issues. It can be searched by "key word" or phrases. On the [ticket](#), you make a note of the problem the user is having. You may then call or email the person to gather additional information. This additional information helps you better understand the problem. Next, you explore possible causes of the reported problem. You look for solutions using the company's manual or the [database](#). You read the information carefully and develop a solution. You then attempt to correct the problem.

If you are unable to solve the problem within 15-20 minutes, you take the issue to a more experienced Help Desk staffer. If you are able to solve the problem, you make a note of the solution and the outcome before closing the [ticket](#). Each [ticket](#) is closed when the problem is solved. As new issues come in, you refer to the [database](#) to locate solutions to problems that have already solved.

Workplace Scenario (High School Level)

This scenario is based on the work of a Tier I Help Desk staff member. For more information, view [this video](#).

You are a Tier I Help Desk staff member in the Information Technology (IT) department at the headquarters of a large [retail](#) company. You are assigned to answer requests for computer technical support by employees throughout the company's headquarters. These requests come in either by email or phone. It is your job to provide the first response to customer issues (for example, my computer won't boot up) and to try to solve small IT problems. If you are unable to solve the problem, you refer it to a more experienced [colleague](#). You also track the service records associated with each problem you solve. Each time you receive an email, you open a new [ticket](#) in the department's electronic [database](#) and make a note of the issue the user is experiencing. You may then either call or email the person to gather additional information that will help you better understand the problem. Based on the information you gather, you analyze possible causes of the reported problem. You research solutions using the company's [troubleshooting](#) manual or the company's computer-based "knowledge base" system. This system helps you troubleshoot possible solutions based on key words. You must locate the information in the knowledge base and read carefully to understand the steps you or the user must take to solve the problem. Manuals often contain technical vocabulary that you have to know to fully understand the solutions you are researching.

You then attempt to fix the problem. If you are unable to solve the problem within 15-20 minutes, you take the issue to a more experienced Help Desk staffer. You carefully document your analysis and solutions that you considered and discarded. You also make a note of the solution that solved the problem and the outcome before closing the [ticket](#). Each [ticket](#) is closed when the problem is solved. As new issues come in, you refer to the [database](#) to locate solutions to problems you and your colleagues have already solved.

Core instructional context

Lack of reading skills presents significant challenges to students' career and college readiness. While the majority of the adults in this country are functionally literate, a high number of adults in this country are poor readers and this has major implications for employers. Adults with low literacy levels are more likely to be unemployed or hold very low paying jobs. According to the National Center for Educational Statistics, " ...about 22% of American adults have minimal literacy skills. Some are functionally illiterate in that they can read some words but not enough to understand simple forms or instructions."

In order to help students become good readers, teachers should focus on skills to help build overall literacy, including vocabulary, fluency, and comprehension development.

A good reader

- confidently approaches reading tasks.
- activates their background knowledge before reading.
- knows his or her purpose for reading.
- can make predictions and choose appropriate strategies for the passage.
- summarizes major ideas and recalls supporting details, makes inferences, and paraphrases.
- can focus his or her complete attention on reading.
- uses appropriate word decoding skills.
- can monitor comprehension during and after reading.
- can anticipate and predict meaning of words by using context clues and other strategies.
- can create visual and sensory images from text.
- has a large repertoire of strategies to help them attack an unfamiliar passage.

The following activities are ideas to help build student vocabulary and background knowledge, fluency, and comprehension skills.

Building Vocabulary and Background Knowledge

In order for students to raise their reading proficiency, they need repeated exposure to new words.

Encourage students to skim the assigned text and identify unknown words prior to reading and provide descriptions or an explanation of a new term or word for students. One helpful resource to support this is [Innovativocab](#). Students should make notes of unknown words to review and learn by reusing the word in an original sentence and practicing the word orally. Students can also provide their

own description for the word and attempt to connect the word to a picture or make a personal anecdotal connection to the word.

Another way to help students build vocabulary is to help them build semantic maps, placing the word to be defined in the center and brainstorming ideas about the word. As students identify words that define the main word or mean the same, draw the semantic map to show relationships. [Visuwords](#) is an online thesaurus that provides semantic maps for words that are entered. Rolling over the words in the semantic map provides the definition. Using this website is one way for students to build knowledge about families of words.

Students can also be encouraged to learn Greek and Latin prefixes, suffixes and common root words. Point out to students that they can unlock the meaning of a significant number of new words by knowing these word forms. One resource students might use is "[Root Words, Roots and Affixes](#)" or the list "[English Language Roots](#)". One strategy the instructor can use is to identify roots and affixes of word that may be unknown to students during a vocabulary lesson. For example, the word "auditor," contains the root aud- meaning to hear or listen and the suffix "-tor" meaning "one who" or "one who hears or listens."

Finally, have students keep their own vocabulary journal to record unknown words, especially academic words ([The Academic Word List](#)) is a resource to help with identifying academic words. Have students record graphics and definitions in their own words as this can help students to better retain words over time.

Building Fluency

Fluency —the ability to read with accuracy, speed and expression —is important because it allows the reader to avoid the process of decoding each word along the way. One effective strategy to build fluency is repeated reading or the strategy of reading short passages several times and attempting to read a little faster each time. It will be more difficult for instructors to understand the students' reading issues if they are only asked to read silently. According to Guglielmino (2005), "finding a balance of activities (such as explicit instruction, guided reading, echoing the teacher's reading, reading in pairs, and silent reading) every day within a safe and non-threatening environment is most likely to produce positive results."

One specific strategy to build fluency is [WARF](#), which encourages students to:

- **W**iden your eye span. Read groups of words or phrases rather than one word at the time.
- **A**void skip backs. Keep reading even if you are not sure you understand.
- **R**ead silently. Even if you have to place a finger on your lips to remind you.
- **F**lex your reading rate. When reading important information, read more slowly than when you are reading less important, detailed information.

Other strategies to improve fluency include timed reading, repeated and monitored oral reading, teacher modeling, paired (partner) reading, tape-assisted reading, and chunking. For more information on these strategies, see: [Florida GED PLUS College Preparation Program Curriculum and Resource Guide](#).

Improving Comprehension

It is important to teach students that with practice, reading can be easier. Instructors should consider their approach to teaching comprehension in terms of where their particular students' confidence levels are in regards to reading.

Useful strategies for comprehension include retelling or summarizing the passage, discussing the reading and evaluating what was read. Writing a summary of what was read also reinforces the reading-writing connection. Encourage students to take notes as they read using a system such as [Cornell Notes](#) or [Thinking Notes](#). Using graphic organizers to help students before, during, and after reading are also great tools, such as these graphic organizers from [Scholastic](#).

Help students learn pre-reading strategies such as [TIPP?](#). This technique uses skimming to preview the text and develop questions students think the text may answer. Point out that scanning is a different strategy used to locate specific information, such as the answer to a question. This is also a

good time to activate prior knowledge with the use of a [KWL chart](#) or other strategy to help students recall what they already know about the topic.

Finally, writing for understanding is a simple way for students to show and for instructors to check for comprehension. Students can keep a journal to predict what a reading will be about and then summarize the entire text after they read sections or individual passages, making note of any questions they have about the text. This is an easy way to model comprehension strategies in the classroom as well.

Reading Technical Texts

Technical texts such as those in IT are especially challenging to read and comprehend. Reading experts (Fry, 2000, p. 74) suggest five kinds of information to look for in technical text: definitions and terms, examples, classifications and listings, comparison and contrast, and cause and effect. Fry also suggests a seven-step plan for students as they attack technical material.

1. Learn the technical terms.
2. Analyze the structure and understand it.
3. Skim the text, identifying questions you have.
4. Be sure you have a full understanding of each section before moving on.
5. Read slowly.
6. Pay attention to examples
7. Summarize after reading.

Example Activity

As described in the scenario, sometimes Help Desk staff will need to read the requests for technical support that come to the company's [IT department](#) by email. Based on their understanding of the IT issue, Help Desk staff will have to relay a solution, and if no solution is known, they will have to refer to a [database](#) of written solutions to problems where the technical jargon may be unknown.

Show students a short [video on the IT field](#) for those who are unfamiliar

Or show students a video specifically on the career of the [Help Desk Technician](#)

Consider introducing the skill set by brainstorming why it is important to follow instructions in daily life. Ask students what types of directions they might need to follow and how many of these are written and need to be read. What would happen if a student didn't follow the directions correctly because he or she didn't understand part of them?

Divide students into teams and provide directions on how to use [Glogster](#) or tell students to use the directions on the website. Students will need to create a free account to use Glogster. Have students create a Glog or poster about types of careers in IT. Students can use a jigsaw technique to conduct the research while one student builds the Glog. Students will share the Glogs they create.

Assessment

Use a classroom-developed reading and literacy assessment such as the sample assessments based on the reading components listed below. Additionally, use a rubric to assess students' written summaries of technical text they have read. Also, use vocabulary quizzes or content quizzes to assess students' knowledge and understanding of the content they've read.

- [Practice a reading assessment](#) from the state exam
- Create a [cloze test](#)
- Create a [vocabulary test](#)

Contextualized learning activities

Learning Technical Jargon

Have students choose one of the following technical product reviews from Wired magazine and read through it for understanding. After writing a short summary of the product review, have students go through and highlight any specific technical vocabulary that either they didn't know or that is crucial to understanding of the review.

- [Tiny Print Server Let's You Print from an iPad](#)
- [Even After Price Drop, Sony Vaio Z is Still a Big Ticket Notebook](#)
- [Pivot Point](#)
- [Back up Your Computer, and Your Facebook Photos While You're At it](#)

Have students gather at least five words and find their meaning through an Internet keyword search or through a technical vocabulary resource such [Technical Vocabulary](#). In addition to providing their own definition for the new vocabulary word, have students draw a graphic representation or make a personal connection to the word to help them better remember and recall its meaning. Use the "[Vocabulary Squares](#)" graphic organizer from the [English Companion](#) website to complete the assignment.

Understanding [Troubleshooting](#) Guides

Have students use one of the following scenarios that they could come across as an IT Help Desk technician. After reading a [troubleshooting](#) guide on the topic, have students compose an email back to the [client](#) outlining the steps for them to take to resolve their issue and/or make a list of follow-up questions to ask. Remind students to make sure that they are paraphrasing in their own words and not just copying the [troubleshooting](#) guide.

Scenario 1: Resolving Connection Issues

Dear Helpdesk,
I'm unable to connect to the Internet while I'm working from home. I pay for Internet service so this shouldn't be an issue. Can you help me so that I can get my work done?

Thanks,
Helpless and Disconnected
[Troubleshooting Guide](#)

Scenario 2: Lack of Power

Dear Helpdesk,
No matter what I do, my computer will not turn on. This is a brand new computer that I just received from you last week. Can you please help me fix this?

Sincerely,
Without Power
[Troubleshooting Guide](#)

Scenario 3: Screen Image Issues

Dear Helpdesk,
I dropped my computer accidentally on the carpet and now I'm getting a blurry screen and the colors are off. I hope this problem is fixable because it is difficult to use in this condition. Can you please help me get my computer back in working order?

Regards,
Blurred and Confused
[Troubleshooting Guide](#)

Following Complex Directions

Provide origami paper to students and ask them to visit the [Origami Paper Plane](#) website and select a paper airplane to make. Once students have selected a paper airplane to create, ask them to write more complex directions in their own words that are detailed enough that the airplane can be made

without the graphic diagram. In pairs, ask partners to exchange their newly written directions and see if they can follow the directions to create a perfect airplane.

Knowing What Questions to Ask

Partner students together and have one play the role of the Help Desk technician and the other of a [client](#). The person playing the [client](#) will make up a problem from their own experiences, such as "I lost all of my work, how do I get it back?" The IT person needs to gather as much information as possible to solve the problem over the phone and will develop a list of questions to ask the [client](#) caller. Questions can then be brought to the group and the collective class knowledge can critique the questions.

Understanding the Main Idea

Have students select an article from [IT Magazine](#). Have students fill out the Summary Notes graphic organizer found at [English Companion website](#) in order to practice their summarizing skills.

Alternatively, have students use the [Cornell Notes graphic organizer](#) from the [English Companion website](#) in order to scaffold their reading. Be sure to model the process for using one of these graphic organizers (if not all of them) in front of the class first.

Review Websites

During class, have students locate websites related to the scenario. They can begin with any questions they have as keywords in a Google search. Have students read the information presented on the websites to determine if these websites are successfully answering their questions. In pairs, have students attempt to distinguish between what they believe to be reliable and unreliable websites and discuss how they distinguished between those ideas and report back to the class. Have students compile a list of criteria for websites that are not reliable and that are reliable. Ask students to identify how some websites are reliable and others are not. Ask students to explain how easy or hard it was to search for the answers to their questions regarding the scenario.

Contextualized test items

Give students a vocabulary multiple-choice test based on any technical jargon vocabulary activities completed in class.

Provide students with a mock Help Desk [ticket](#) or even a real one from the college's [IT department](#). Ask students to create a [troubleshooting](#) chart based on their understanding of the issue, such as the one in this [video](#)

Contextualized project

Ask students to research something they would like to know more about in the IT field, coming up with some guiding questions on topics such as:

- Computer Viruses: How to protect your computer from getting infected? Why do they call them viruses? [Is it a real virus or a hoax?](#)
- Cloud-based Computing: What is it? Who invented it? Why is it a good solution for some but maybe not all?
- Mobile Devices: What are all the different types of devices considered computers? What can you do with these different devices? For what tasks are the different devices best?
- The History of the Internet: Who developed it? How did it expand? Where does it reside?

Additional or extension activities, multimedia, readings and/or resources

[Sabes Technology](#)

[Sample Help Desk Ticket](#)

Invite someone from the college's [IT department](#) to do a show and tell about various daily tasks and hold a Q&A with students about the job industry.

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