1 TECHNOLOGY

SKILLS AND STRATEGIES

- Identifying Claims and Evidence
- Managing Unfamiliar Words
- Annotating a Reading

SKILLS AND STRATEGIES 1

Identifying Claims and Evidence

In academic writing, an author makes claims and cites evidence to assert a thesis and support a point of view. A claim is an arguable statement; evidence is information that shows the statement to be true or untrue. To identify claims and evidence, good readers search for key words and phrases called "lead-in" or "signal" phrases. Signal phrases, such as *in the words of* or *as the author states*, are used to introduce quoted material or to paraphrase the words of another author. Writers often cite and evaluate the ideas of others to support or argue against previously stated claims. Identifying claims and evidence will help you understand and evaluate the major ideas in academic texts.

Examples & Explanations

①**There is no doubt that** new forms of technology have made a great impact on society. ②By working both independently and in teams, inventors and scientists have helped improve many aspects of our lives; not just methods of travel and communication but also in the areas of medicine, engineering, and business. ③However, *where* these specialists work plays a role that is just as important to the development of new ideas as the inventors themselves.

④Cities like San Francisco, California, or Boston, Massachusetts, attract large numbers of engineers and computer scientists with Bachelor of Science degrees from top U.S. universities. ⑤**It is reported that** there are 10 percent more technology and engineering experts working in these two areas compared to the rest of the U.S.

Writers usually make a claim first and then support it with evidence. To identify claims and evidence, good readers ask the following questions as they read a paragraph:

- *What claim does the writer make about the topic?*
- *What evidence does the writer use to support a claim?*
- *What phrases does the writer use to indicate a claim or supporting evidence?*

In this text, sentence 1 introduces *technology* as a general topic. The phrase *there is no doubt that* is used to introduce a claim the writer makes about this topic. Sentence 2 introduces several facts (general knowledge) about technological achievements before asserting the thesis. Sentence 3 then gives the writer's main claim, or thesis, about the role of the places where specialists work.

In sentence 4, the writer mentions specific cities as examples that support his thesis. In sentence 5, he gives a statistic as evidence. The lead-in phrase *it is reported that* signals that the writer will present this evidence.

⑥"Silicon Valley" in northern California stretches from the San Francisco Bay to the Santa Clara Valley and has been the home of American computer innovators and manufacturers since the 1970s. ⑦**According to** expert Enrico Moretti, author of *The New Geography of Jobs*, places like Silicon Valley are "brain hubs" – central locations where great numbers of scientists, engineers, and innovators can meet and work. ⑧In addition, Moretti **states** that workers in these fields generate five times more local jobs than other industries.

In sentence 6, the writer further supports his thesis by introducing another area where specialists create new forms of technology. In sentence 7, he uses a lead-in statement, *according to*, before citing evidence from an expert. Sentence 8 offers additional information and statistics from the expert to support the effects of brain hubs.

⑨Moretti also **analyzes** one of the most fundamental aspects of future job growth in the U.S.: the impact of education with a focus on Science, Technology, Engineering, and Mathematics (STEM) courses at the elementary and high school levels. ⑩He **claims** that STEM students are more apt to go on to college and complete studies in a STEM field. ⑪In one analytical report, **statistics showed** that these college graduates have been moving to areas like New Orleans, Louisiana; Pittsburgh, Pennsylvania; and San Antonio, Texas, among other cities, where the cost of living is not as high as it is in Silicon Valley.

In sentences 9 and 10, the writer uses the words *analyzes* and *claims* in order to make a claim about the impact of STEM courses on college education and job growth. Sentence 11 cites statistics from a report to support the claim that college graduates in science and technology fields are moving to other brain hubs across the U.S.

⑫Brain hubs play an important role in bringing together a diverse group of well-educated scientists and creative thinkers. ⑬These places have lasting effects that can influence the future of technology as well as the global workforce.

Sentences 12 and 13 contain a concluding summary about brain hubs that re-asserts the thesis and supports what the writer has stated previously in the text.

The Language of Claims and Evidence

Academic writers often present and evaluate claims and evidence from outside sources to support their own ideas. Here are some words and phrases that can signal claims and evidence.

SIGNAL VERBS AND NOUNS THAT INTRODUCE CLAIMS		SIGNAL VERBS AND NOUNS THAT INTRODUCE EVIDENCE
admit – admission	*consider – consideration*	*cite – citation*
agree – agreement	*contend – contention*	*indicate – indication*
argue – argument	*insist – insistence*	*point out/to*
assert – assertion	*state – statement*	*prove – proof*
believe – belief	*suggest – suggestion*	*reveal – revelation*
claim – claim		*show*
SIGNAL PHRASES THAT INTRODUCE CLAIMS		**SIGNAL PHRASES THAT INTRODUCE EVIDENCE**
according to		*according to*
in the opinion of		*a study found/showed*
in the words of		*the evidence shows*
it is clear/likely that		*in fact*
there is little/no doubt that		*the fact is/that*
		is evidence of
		it is reported that
		statistics show

Strategies

These strategies will help you identify claims and evidence.

- Identify the writer's main claim, or thesis, as soon as possible. It is often found in the first few paragraphs and summarized in the final paragraph of a text.
- Before you begin reading, scan the text for names, dates, statistics, key words, and phrases that help you identify claims and evidence.
- As you begin each paragraph, ask yourself: *What is the writer's point of view? What claim does the writer make? What evidence does the writer use to support the claim?*
- Identify signal verbs and phrases that a writer uses to give evidence to support a statement.
- Look for signal verbs and phrases that writers use to introduce claims or evidence from other authors or experts.
- Note the use of certain transition words like *although, despite, however, likewise,* and *similarly* that can be used to contrast or compare ideas and evidence with the claims of others.
- As you read, look for sentences that connect statements at the end of one paragraph with the next paragraph. Writers sometimes make a claim at the end of a paragraph

and elaborate on or give evidence for that claim in the first sentence of the next paragraph.

Skill Practice 1

Read the following paragraphs. As you read, underline the signal verbs and phrases that introduce a claim or evidence. Then identify the statement that follows as a claim (*C*) or evidence (*E*). The first one has been done for you.

1 The expression "great minds think alike" is often used when two or more people express the same idea at the same time. Technology blogger Matt Novak believes (C) that this statement can be proven. He asserts that "the concept of the nerdy, lone inventor is a myth." Novak also states that invention is "messy" and takes a great team of developers in order for a great idea to become a reality. Whether we look at specific examples from history, like Serbian-American scientist Nikola Tesla's system for alternating electrical current or one of the many devices credited to the American inventor Thomas Edison, Novak points to the fact that none of these things were actually created by a single individual. The evidence shows that other Italian and German inventors contributed to the development of alternating current, while Edison was only one of a number of inventors of light bulbs. In fact, Novak contends that something called "simultaneous innovation" was much more common throughout history: a situation where more than one person has the same new idea at the same time and makes a great effort to develop that idea and bring it to life.

2 Matt Novak's major assertion regarding the lone inventor controversy is relevant to issues that arise today with patents for devices or ideas. For example, who invented the iPad? Novak cites court cases where "rectangular viewing devices" appeared in science fiction movies from the 1960s and 1970s, thereby "invalidating the patent of the iPad." This supports the argument that no single person came up with the idea for the tablet or iPad and that its designs were simply improvements on the next generation of an earlier concept. It is clear that no matter what they are called, these devices are actually products of "simultaneous innovation" – teams of scientists working on the same problems. Novak insists that to perpetuate and uphold the myth of the lone inventor is to ignore the diverse group that was necessary to create these devices.

Skill Practice 2

Read each paragraph and the claim that follows. Highlight the evidence that supports the claim in the paragraph. Underline any phrases that introduce the evidence.

1 Some of the best-known inventors of all time, including Alexander Graham Bell, Thomas Edison, and the Wright Brothers, began their research in some kind of home

laboratory: a basement workshop, a garden shed, or a kitchen. In the 1950s, this idea evolved into the popular notion that the lone engineer or computer technology expert "tinkered" in a garage or some other place where he could experiment with his own equipment and inventions. However, several modern technology theorists, such as physicist Eric D. Isaacs, assert that none of the greatest inventions of the past century were actually created in a garage. On the contrary, Isaacs points out that these creations were produced by research and development (R&D) teams working in spacious, multimillion-dollar laboratories. Although big companies such as Apple, Hewlett Packard (HP), Google, and Microsoft actually had their earliest origins in a garage, the fact is that their founders often used equipment provided by government or corporate money to get their start. According to tech blogger Jodi Lieberman, "all the real development work occurred in an investor- or government-funded, state-of-the-art lab." Lieberman agrees with Dr. Isaacs that Americans need to "let go of the garage myth" and embrace the fact that innovation clusters and brain hubs, where many exceptional minds work together, are the real homes of great inventions.

Claim: The greatest inventions of the last 100 years were the result of teams of scientists.

2 According to Evan I. Schwartz, in his biography of inventor and electronics wizard Philo Farnsworth, Farnsworth began "tinkering" at the age of 20 in a laboratory above his garage. Farnsworth's work started a ripple effect that would change the world forever. In 1927 he successfully demonstrated the first all-electronic television system, which was based on a design he drew in his high school chemistry class. From the late 1920s to the mid-1930s, Philo Farnsworth was engaged in legal battles with RCA, the corporate giant of the radio airwaves, to secure the rights to the *Television System.* RCA's leaders were determined to gain the rights, and employed Vladimir Zworykin to work simultaneously on a similar system. Zworykin visited Farnsworth's laboratory to view the device that Farnsworth had been tirelessly creating. Though Zworykin held patents for very similar devices, he was unable to produce a working television. After years of court cases against RCA, Farnsworth was finally granted the copyright, or patent. It was not until 1939 that RCA was able to sell their "electronic television cameras." During his lifetime, Farnsworth patented more than 130 different devices, mostly on his own. As the title of Schwartz's book implies, it is clear that Farnsworth was *The Last Lone Inventor.*

Claim: Philo Farnsworth was a lone inventor who should be credited with the invention of the modern television.

Before You Read

Connecting to the Topic

Discuss the following questions with a partner.

1 Look at the title. What do you think the reading will be about?
2 Do you work best in a group or on your own? Explain your answer.
3 Do individuals or teams make the best contributions to society? Explain your answer.
4 The "ripple effect" is a series of things that happen as a result of a particular action or event. How could it apply to inventions and new ideas? Give examples to support your answer.

Previewing and Predicting

You will understand a text more easily if you skim and scan for key words. Look for signal verbs and phrases like names, places, dates, or other facts. Scan for signal phrases in each paragraph.

A Read the first sentence of each paragraph in Reading 1 and scan for key words. Then read the questions. Write the number of the paragraph where you think you will find the answer to the question. The first one has been done for you.

PARAGRAPH	KEY WORDS AND PHRASES
4	Was Thomas Edison really a lone inventor?
	How did Steve Wozniak feel about working in a team?
	Did Steve Jobs think highly of customer feedback?
	What device influenced the development of the computer?
	How do technology specialists collect and measure data?
	How many cell phone and Internet users are there in the world?
	Do customers always give feedback?
	What are the origins of the Internet?
	Who invented the wireless telegraph?
	What do experts suggest is the best solution to the debate between working alone or in a team?

B Compare your answers with a partner's.

While You Read

As you read, stop at the end of each sentence that contains words in bold . Then follow the instructions in the box in the margin.

READING 1

Technology and the Individual

I. The Ripple Effect

1 Nearly 200 years before technology wizards[1] Steve Wozniak and Steve Jobs launched the Apple computer and changed how the world communicates, inventor Charles Babbage came up with a kind of engine that could mechanically perform calculations. This primitive calculator would become the precursor to modern electronic devices. Babbage's ambitious efforts made it possible for twentieth-century computers to evolve from performing complex calculations to being a means for everything from design to communication. Two centuries later, Babbage's original design for a calculator has evolved into something that today's computer users consider a simple "app." Many experts agree that without Babbage's early work, technology of the past century may have progressed much more **slowly**. It is no surprise then, that Babbage is often called the "father of the computer."

2 Similar to Babbage's accomplishments are the innovations of Italian physicist and radio pioneer[2], Guglielmo Marconi. In 1901, Marconi discovered a way to convey information signals around the world. This transatlantic transmission of radio signals – known as the wireless telegraph – was the first ripple in a wave that would develop into the Internet. It can be said that Marconi's research continues to inspire and support advancements in the field of communication and information technology. In 2014, the Marconi Society (founded by Marconi's daughter) gave its highest prize to India-born Arogyaswami Joseph Paulraj, of Stanford University in California, for his invention of a transmission system with multiple "antennae," or receivers. This revolutionary system is at the core of high speed Wi-Fi and Broadband networks, used by billions of people **worldwide**.

3 The invention of the Internet cannot be attributed to one person. Instead, several individuals share the **credit**. While researchers were creating a special email system (Ethernet) to be used among employees at the copier company Xerox PARC, other technology experts were simultaneously developing the infrastructure[3] of the Internet. This is known as Transmission Control Protocol/Internet Protocol (TCP/IP). In simple terms, TCP is a "layer" of transmission that manages the way data files are gathered, sent, and combined to create a message. The lower layer of this system is Internet Protocol (IP). IP ensures that the message gets to

WHILE YOU READ 1
Highlight a signal verb in this sentence that introduces a claim about technology.

WHILE YOU READ 2
Look back at paragraph 2 and highlight two claims.

WHILE YOU READ 3
The writer makes a claim in this sentence. Highlight the evidence for the claim.

[1] *wizard:* a genius or expert
[2] *pioneer:* a person who is among the first to develop or study an area of knowledge or scientific field
[3] *infrastructure:* the basic structure of a system that is necessary for its operation

the right destination. In the journey from wireless telegraph to wireless Internet, the inventions of Babbage and Marconi were significant and necessary steps in the process, resulting in communication systems that could function and deliver messages effectively.

II. "Sheltered Innovation" vs. "Combinatorial Creativity" – Lone Worker or Team Player?

4 Thomas Edison's name may evoke an image of the stereotypical solitary inventor, working tirelessly in a laboratory to perfect the latest version of a device. This image, however, does not reflect the reality of Edison's world. In Menlo Park, New Jersey, Edison created his own "invention factory," a concept that companies in the "brain hubs" of California's Silicon Valley – the home of all things technological – have tried to imitate in their own workspaces. Edison's work environment could be considered the first research and development lab. Though he experienced long periods of working in isolation, he also collaborated with teams of specialists from all over the world. These technicians and machinists, whom he had invited to his facility, aided Edison in the process of producing and perfecting his devices.

5 It is not uncommon for an individual scientist or engineer to work alone at some point in time. This method of working independently to produce something original is often called *sheltered innovation*. Sheltered innovation allows the inventor to be creative without the influence of other scientists' ideas, while also evoking the nostalgic[4] image of the "garage inventor." Some technologists believe that this approach toward product development allows for more creativity. Steve Wozniak, co-creator of Apple/Mac computers, felt that inventors are like artists and work best alone. In the words of Wozniak, "I don't believe anything really revolutionary has ever been invented by a committee. . . I'm going to give you some advice that might be hard to take. . . Work alone. . . Not on a committee. Not on a team." Yet despite his statements, Wozniak was an integral part of the "brain hub" of **Silicon Valley**.

6 Other Internet experts, however, like Steven Johnson, author of *Where Good Ideas Come From*, assert a different approach to creativity. Johnson contends that ideas must collide, or run into one another, which cannot happen while working **alone**. He refers to this collision of great minds as *combinatorial creativity*. This term was first defined by Margaret Boden, a pioneer researcher in artificial intelligence[5], cognitive and computer science, and psychology. She expressed combinatorial creativity as "the unusual combination of, or association between, familiar ideas. . . ." Boden, however, does not deny that working alone is significant to the creative

WHILE YOU READ 4
Highlight the transition words in this sentence that introduce evidence that contrasts with claims in the previous quotation.

WHILE YOU READ 5
Highlight a signal verb in this sentence that introduces a claim.

[4] *nostalgic:* feeling pleasure and sadness at the same time when thinking about the past
[5] *artificial intelligence:* the use of computer programs that have similar qualities of the human mind, such as the ability to recognize language, pictures, and learn from experience

process. Her method somehow bridges that gap between the autonomous inventor, Steve Wozniak, and team player, Steven Johnson.

III. How Are We Doing?: The Individual and Feedback

7 Whether innovative undertakings are pursued by an individual or a group, there is no doubt that the globalization of technology has created a shift in the way individuals communicate, work, socialize, and conduct business. From face-to-face meetings and telephone conversations to texting, video chats, and web-based discussions, the world wants and needs immediate access to it all. This rapid progress in technological development has an impact on people in ways that are both observable and measurable. According to a global study, while more than 90 percent of the world's population own cell phones, more than 3 billion people are Internet subscribers. And that number continues to grow. These statistics also raise a number of questions regarding the development of products or services and the individual: With such a high number of users, can an individual user affect how a new device can be improved? How do technologists get feedback from individuals, and what do they really think about it?

8 In 1997, when asked about using customer feedback, Apple co-founder Steve Jobs admitted that he viewed user feedback as an impediment to enhancing Apple products and devices, and placed little value on using focus groups. Jobs claimed that "a lot of times, people don't know what they want until you show it to them." Jobs, like his partner Steve Wozniak, was a supporter of working in isolation.

9 For users to have any influence on modifications or changes to a device, they must communicate information and opinions to the developers. This is generally done through surveys, comments, or direct communication through a company's marketing system. Most technologists get a head start on feedback by testing services or products before they are released to the public.

10 When technologists truly desire feedback from users for the development of a product or the improvement of a system, they conduct their final

Figure 1.1 Internet and Cell Phone Use