Explore the Roles of Drafters

Unit: Historical Perspectives of the Drafting and Design Field Industry

Problem Area: Historical Roles of Drafters, Designers, Engineers, and Architects

Lesson: Explore the Roles of Drafters

Student Learning Objectives.

Instruction in this lesson should result in students achieving the following objectives:

1. **Describe the role of drafters.**
2. **Explain the historical influence of drafters, designers, architects, and engineers.**
3. **Identify career possibilities related to drafting.**

List of Resources.

The following resources may be useful in teaching this lesson:

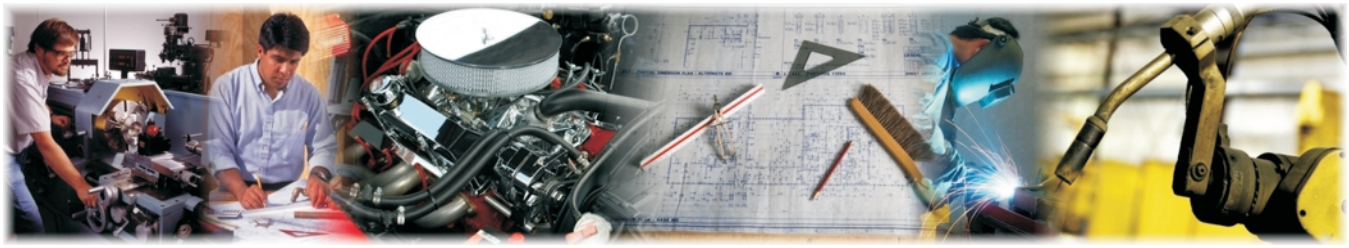
American Design Drafting Association. Accessed on March 10, 2008. <http://www.adda.org>.

American Institute of Architects. Accessed on March 10, 2008. <http://www.aia.org>.

Brown, Walter C., and Cloise E. Kicklighter. *Drafting for Industry*. Goodheart-Wilcox, 1995.

Kicklighter, Cloise E. *Architecture: Residential Drawing and Design*. Goodheart-Wilcox, 2005.

Occupational Information Network. Accessed on March 10, 2008. <http://online.onetcenter.org/>



U.S. Department of Labor. *Occupational Outlook Handbook*. Accessed on March 10, 2008. <http://www.bls.gov/oco/>.

Walker, John R., and Bernard D. Mathis. *Exploring Drafting*. Goodheart-Wilcox, 2007.

Wohler, Terry. *Applying AutoCad 2008.* Glencoe/McGraw-Hill, 2008.

List of Equipment, Tools, supplies, and Facilities

- ✓ Overhead or PowerPoint projector
- ✓ Visual(s) from accompanying master(s)
- ✓ Copies of sample test, lab sheet(s), and/or other items designed for duplication
- ✓ Materials listed on duplicated items
- ✓ Computers with printers and Internet access
- ✓ Classroom resource and reference materials

Terms.

The following terms are presented in this lesson (shown in bold italics):

- architectural drafters
- cartographers
- civil drafters
- drafting educators
- electrical drafters
- electronic drafters
- mapping technicians
- mechanical drafters
- patent drafters
- pipeline drafters

Interest Approach.

Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situation. A possible approach is included here.

> *Ask students to identify their hobbies. Create a list. Under each heading on the list, brainstorm (with the class) items that drafters/designers and designers have created. For example, people who love to travel may think of skyscrapers. Technology buffs may think of computer hardware, cell phone technology, or other nanotechnology applications. People who love to draw may think of science fiction animation, a recent graphic novel, or a book illustration. For those with an interest in medicine, drafting examples may include splints and hip or knee replacements.*

> *Tell the students that drafters/designers work in all career fields and in all interest or hobby classifications. Drafters/designers work for many industries, including aerospace, road and highway construction, surgical tool*

manufacturers, recreational equipment, and utility companies. Most inventions, innovations, and improvements to existing products cross the desks of drafters/designers.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

Objective 1: Describe the role of drafters.

Anticipated Problem: What knowledge, skills, and abilities does a drafter possess to perform drafting tasks?

I. The role of drafters/designers involves knowing much and possessing a variety of knowledge, skills, and abilities to assist with successful task completion.

A. What is drafting?

1. Drafting is a form of graphic communication concerned with the preparation of drawings needed to develop and manufacture, fabricate, or construct products or buildings.
2. Drafting is an important part of modern industry; drawings are often the best way to explain ideas.
3. Drafting is known as the "language of industry."
4. Drafting tasks may be completed manually (on drawing boards) or on CADD (computer aided drafting and design) systems.
5. Drafters/designers must often complete their tasks according to project deadlines.

B. Knowledge

1. Design—Knowledge of design techniques, tools, and principles involved in the production of precision technical plans, blueprints, drawings, and models is essential.
2. Engineering and technology—Knowledge of the practical application of engineering science and technology is needed.
3. Mathematics—Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications is critical.
4. English—Knowledge of the structure and content of the English language (e.g., the meaning and spelling of words, rules of composition, and grammar) is necessary to success in this field.
5. Production and processing—Knowledge of raw materials, production processes, quality control, costs, and other techniques (to maximize the effective manufacture and distribution of goods) is extremely useful.

6. Customer and personal service—Knowledge of principles and processes for providing customer and personal services (e.g., customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction) is necessary.

C. Skills

1. Time management—Managing one's own time and the time of others is essential.
2. Active listening—Giving full attention to what others are saying, taking time to understand the points being made, asking appropriate questions, and not interrupting are key skills.
3. Reading comprehension—Understanding written sentences and paragraphs in work-related documents is essential.
4. Mathematics—Using mathematics to solve problems is critical.
5. Judgment and decision making—Considering the relative costs and benefits of potential actions and choosing the most appropriate action(s) assist in this field.
6. Writing—Communicating effectively in writing as appropriate for the needs of the audience and the purpose of the document are necessary skills.
7. Critical thinking—Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems is vital in this field.

D. Abilities

1. Oral comprehension—The ability to listen to and understand information and ideas presented through spoken words and sentences is essential.
2. Oral expression—The ability to communicate information and ideas (through speaking) so others will understand is extremely important.
3. Deductive reasoning—The ability to apply general rules to specific problems to produce answers that make sense is vital to success in this field.
4. Originality—The ability to create unusual or clever ideas about a given topic or situation or to develop creative ways to solve a problem is useful.
5. Written comprehension—The ability to read and understand information and ideas presented in writing is mandatory.
6. Problem sensitivity—The ability to tell when something is wrong or is likely to go wrong is critical. This does not involve solving the problem, merely recognizing that a problem exists.

E. Tasks

1. Drafters/designers prepare sketches of ideas, detailed drawings, illustrations, artwork, or blueprints by using drafting instruments, paints and brushes, or computer-aided design equipment.
2. Drafters/designers direct and coordinate the fabrication of models or samples and the drafting of working drawings and specification sheets from sketches.

3. Drafters/designers modify and refine designs, using working models, to conform with customer specifications, production limitations, or changes in design trends.
4. Drafters/designers present designs and reports to customers or design committees for approval and discuss any need for modifications.
5. Drafters/designers evaluate the feasibility of design ideas based on factors such as appearance, safety, function, serviceability, budget, production costs/methods, and market characteristics.
6. Drafters/designers read publications, attend showings, and study competing products and design styles and motifs to obtain perspective and to generate design concepts.

Use VM–A to illustrate the different drafting career options. Divide students into groups and give them a problem to solve. For example, the company Advancing Life has learned that elderly people are having difficulty opening a variety of products on the market (because of arthritis and neuropathy). As a result, the student teams must determine what type of container could be substituted for the ease of opening while still preserving the food properly.

Objective 2: Explain the historical influence of drafters, designers, architects, and engineers.

Anticipated Problem: What historical influence have drafters had upon society?

II. Historical influence of drafting

A. Drafting is the one of the oldest documented professions.

B. Drafting processes date back millions of years. Primitive men illustrated the walls of caves with depictions of daily life, hunting expeditions, worship ceremonies, and accounts of deaths.

C. Great changes to the profession are notable during the Egyptian Empire and Chinese Empire, including the development of rice paper. The advent of paper manufacture, and other tools used to make drawings more accurate and legible, represents the beginning of modern drafting.

D. From the Age of Empires through the Industrial Revolution, drafting saw changes in equipment and precision (i.e., printing and the mechanized printing press).

E. The creation of modern electronics and CADD (Computer Aided Drafting and Design) revolutionized the design and product-development industries.

Developing and presenting students with a timeline may help them visualize the history of design. Use VM–B for this purpose.

Objective 3: Identify career possibilities related to drafting.

Anticipated Problem: What careers are associated with the drafting field?

III. Drafting careers

A. ***Architectural drafters*** prepare detailed drawings of architectural designs and plans for buildings and structures, according to specifications provided by the architect.

1. Most occupations in this field require training in vocational schools, related on-the-job experience, or an associate's degree. Some positions require a bachelor's degree.
2. According to the Occupational Information Network Web site, the 2006 median wage was $20.17 hourly and $41,960 annually.

B. ***Cartographers*** collect, analyze, and interpret geographic information provided by geodetic surveys, aerial photographs, and satellite data. These drafters/designers also research, study, and prepare maps and other spatial data in digital or graphic form for legal, social, political, educational, and design purposes.

1. Most occupations require vocational school training, related on-the-job experience, or an associate's degree. Some jobs require a bachelor's degree.
2. According to the Occupational Information Network Web site, the 2006 median wage was $23.19 hourly and $48,260 annually.

C. ***Civil drafters*** prepare drawings, topographical maps, and relief maps used in civil engineering projects (e.g., highways, bridges, flood control projects, and water and sewerage control systems).

1. Most occupations require vocational school training, related on-the-job experience, or an associate's degree. Some jobs require a bachelor's degree.
2. According to the Occupational Information Network Web site, the 2006 median wage was $20.17 hourly and $41,960 annually.

D. ***Drafting educators*** teach or instruct vocational or occupational subjects at the secondary and postsecondary school levels.

1. Most of these occupations require a bachelor's degree, but some may not.
2. According to the Occupational Information Network Web site, the 2006 median wage was $48,690 annually.

E. ***Electrical drafters*** develop specifications and instructions for installation of voltage transformers, overhead or underground cables, and related electrical equipment used to conduct electrical energy from transmission lines or high-voltage distribution lines to consumers.

1. Most occupations require vocational school training, related on-the-job experience, or an associate's degree. Some jobs require a bachelor's degree.
2. According to the Occupational Information Network Web site, the 2006 median wage was $22.51 hourly and $46,830 annually.

F. ***Electronic drafters*** draw wiring diagrams, circuit board assembly diagrams, schematics, and layout drawings used for the manufacture, installation, and repair of electronic equipment.

1. Most occupations require vocational school training, related on-the-job experience, or an associate's degree. Some jobs require a bachelor's degree.
2. According to the Occupational Information Network Web site, the 2006 median wage was $22.51 hourly and $46,830 annually.

G. ***Mapping technicians*** calculate mapmaking information from field notes; then they draw and verify the accuracy of topographical maps.

1. Most occupations require vocational school training, related on-the-job experience, or an associate's degree. Some jobs require a bachelor's degree.
2. According to the Occupational Information Network Web site, the 2006 median wage was $15.55 hourly and $32,360 annually.

H. ***Mechanical drafters*** prepare detailed working diagrams of machinery and mechanical devices, including dimensions, fastening methods, and other engineering information.

1. Most occupations require vocational school training, related on-the-job experience, or an associate's degree. Some jobs require a bachelor's degree.
2. According to the Occupational Information Network Web site, the 2006 median wage was $20.32 hourly and $42,260 annually.

I. ***Patent drafters*** may improve drawings for previously created products or create drawings for newly invented products. They often work with inventors to document each product.

1. Most occupations require vocational school training, related on-the-job experience, or an associate's degree. Some jobs require a bachelor's degree.
2. According to the Occupational Information Network Web site, the 2006 median wage was $20.70 hourly and $43,060 annually.

J. ***Pipeline drafters*** produce the drawings used for the construction and layout of pipeline parts. These drafters/designers are also responsible for designing systems to move substances in refineries, oil fields, chemical plants, and sanitation systems.

1. Most occupations require vocational school training, related on-the-job experience, or an associate's degree. Some jobs require a bachelor's degree.
2. According to the Occupational Information Network Web site, the 2006 median wage was $20.70 hourly and $43,060 annually.

Use LS–A as a worksheet. Have students visit any career or occupationally-related Web site to highlight the employment demand for the next 10 years. For example, you may review the Occupational Information Network at <http://online.onetcenter.org> or the Occupational Outlook Handbook at <http://www.bls.gov/oco/home.htm>.

- **Review/Summary.** Use the student learning objectives to summarize the lesson. The lab worksheet will help summarize information after it has been completed. Have students discuss which career most appeals to them and why. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle.

- **Application.** Use the included visual masters and lab sheet to apply the information presented in the lesson.

- **Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.

- **Answers to Sample Test:**

Part One: True/False

1. T
2. T
3. T
4. F
5. T
6. F
7. F
8. F

Part Two: Short Answer

1. Answers will vary but could include any three drafting careers named in the lesson (e.g., architectural, cartographer, civil, educator, electrical, electronic, mapping technician, mechanical, patent drafter, or pipeline drafting) or others discussed in class.
2. Drafters/designers prepare drawings manually or by using a computer-aided drafting system.
3. Answers will vary but may include any of the following: Occupational Outlook Handbook, Occupational Information Network (O-Net online), guidance counselor, drafting instructor, or other resources discussed in class.
4. Drafting is an important part of modern industry because drawings are often the best way to explain ideas.
5. The U.S. Department of Labor publishes the *Occupational Outlook Handbook* as a source of up-to-date career information.

Part Three: Completion

1. architectural drafter
2. Patent
3. CADD (Computer Aided Drafting and Design)
4. civil
5. mechanical

Sample Test

Name _____

Explore the Roles of Drafters/designers

Part One: True/False

Instructions: **Write T for true or F for false.**

_____1. Drafters must be able to complete tasks by specific deadlines.

_____2. Drafting is known as the "language of industry."

_____3. Drawings may be completed manually or with a CADD system.

_____4. Most drafters complete some graduate-level education.

_____5. Drawings provide a good way to describe design ideas that may be difficult to describe in words.

_____6. Drafters do not work from sketches and notes.

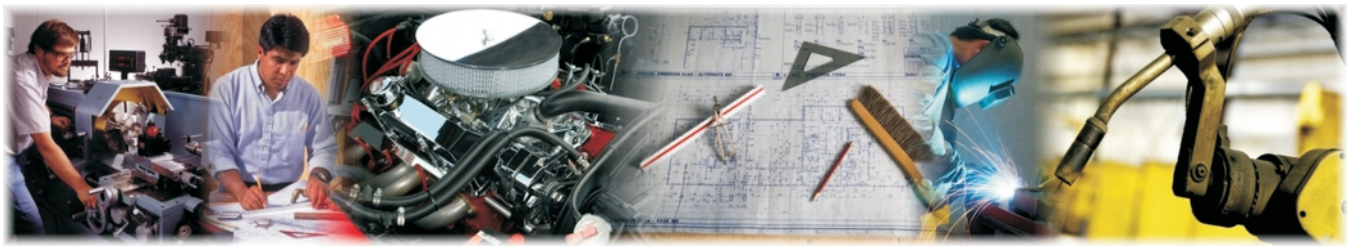
_____7. CADD is an acronym for computer-aided drafting and describing.

_____8. Mapping technicians develop specifications and instructions for installation of voltage transformers and for overhead or underground cables.

Part Two: Short Answer

Instructions: **Complete the following.**

1. Name three specialized fields of drafting.



2. What are the two basic ways in which drafters prepare drawings?

3. Name a source for drafting career information.

4. Why is drafting such an important part of modern industry?

5. What United States Department of Labor document provides up-to-date career information?

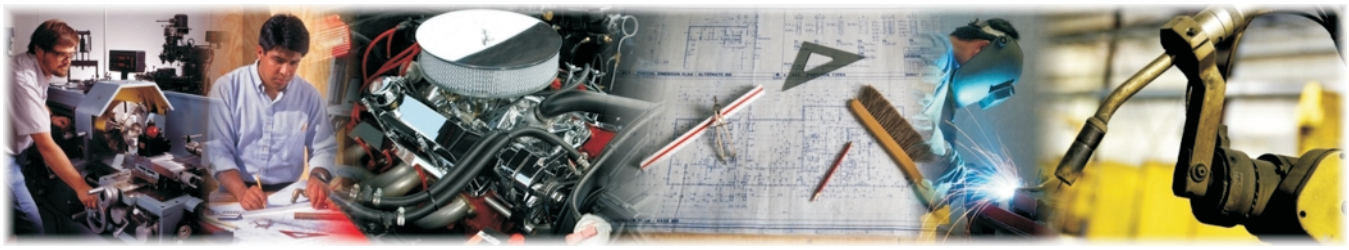
Part Three: Completion

Instructions: **Provide the word or words to complete the following statements.**

1. The _____ drafter produces designs for homes or building spaces.
2. _____ drafters work with inventors to document designs.
3. _____ has replaced drawing instruments (e.g., drawing boards, triangles, and scales) for some drafting tasks.
4. The _____ drafter prepares the drawings used in engineering projects (e.g., highways and bridges).
5. The _____ drafter prepares detailed working diagrams of machinery and mechanical devices.

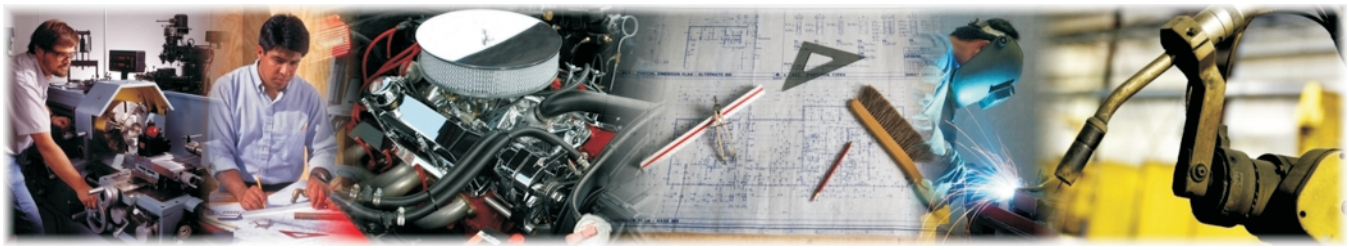
DRAFTING CAREERS

- Architectural drafter
- Cartographer
- Civil drafter
- Drafting educator
- Electrical drafter
- Electronic drafter
- Mapping technician
- Mechanical drafter
- Patent drafter
- Pipeline drafter



HISTORY OF DRAFTING AND DESIGN

- Primitive man
- Chinese design
- Egyptian design
- Age of Empires design
- Industrial Age design
- Technological Age design



LS–A

Name _____

Drafting Careers

Purpose

The purpose of this activity is to create an awareness of the various drafting-related careers, their descriptions, educational requirements, and salaries.

Objective

Describe various drafting career opportunities.

Materials

- lab sheet
- writing utensil

Procedure

1. Using the space below, write details of the various careers as presented by your instructor.
2. Make notations of each career's description, educational requirements, and average salary.
3. The back of this worksheet can also be used to further communicate the careers associated with the field of drafting.