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ABSTRACT

A curriculum guide for grade 8, the document is devoted to the occupational cluster "Transportation." It is divided into five units: surface transportation, interstate transportation, air transportation, water transportation, and subterranean transportation (the Metro). Each unit is introduced by a statement of the topic, the unit's purpose, main ideas, quests, and a list of career opportunities (positions) available in that area. Next, the areas of language arts, mathematics, science, social studies, home economics, industrial arts, music, and physical education (when applicable) are subdivided into purpose, objectives, activities, materials, and notes with a statement relating these categories to the unit topic. The document is one of ten curriculum guides at the seventh and eighth grade levels presenting a career education emphasis. The teacher's manual for the series is available as CE 001 041. The other guides are: consumer and homemaking (CE 001 042); communications and media (CE 001 043); fine arts and humanities (CE 001 044); construction and environment (CE 001 045); agri-business, natural resources, marine science (CE 001 046); public service occupations (CE 001 047); health occupations (CE 001 048); manufacturing, marketing and distribution, business and office occupations (CE 001 049); and hospitality, recreation and personal service occupations (CE 001 051). (AG)

TRANSPORTATION

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
Presidential Building
415 Twelfth Street, N.W.
Washington, D.C. 20004

CAREER DEVELOPMENT EXEMPLARY PROJECT

An
Interdisciplinary
Course of Study
for
Grades Seven and Eight

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GRADE 8

CAREER CLUSTER MODULE

IV

TRANSPORTATION

UNITS/TOPICS

1. Surface Transportation
2. Interstate Transportation
3. Air Transportation
4. Water Transportation
5. Subterranean Transportation (The Metro)

Numbering System

8 = Grade Level
IV = Cluster Number
447 = Page Number in Total Series

CAREER DEVELOPMENT CURRICULUM GUIDE: GRADE 8

CLUSTER/MODULE: TRANSPORTATION

PURPOSE:

To explore and obtain information on opportunities and requirements for occupations related to surface, interstate, air, water and subterranean transportation.

To broaden the students' concepts of the necessity of transportation in any modern society.

To develop an awareness of the cooperation between federal and local governments in the funding of vital transportation projects.

SYNOPSIS:

Surface transportation is necessary in our modern society. It is being improved and broadened as cities and the country grow. The network of beltways, freeways, and super highways is the source of employment for many Americans. We depend upon this mode of transportation for both people and goods.

Interstate transportation provides many job opportunities and is vital to the economic life of our country.

Transportation by air is expanding in the United States and, indeed, the world. This means that many more people will be needed with special training in various positions connected with this means of transportation.

People of modest as well as high economic status know the enjoyment, educational and therapeutic value of traveling by water. Because of this, more people are taking advantage of the opportunity to travel by sea-going vessels, private boats and cruise ships. This has paved the way for many job opportunities.

Within a few years if all goes well, the life style of every D.C. area resident will be transformed by the emergence of a rapid rail system commonly referred to as Metro. The need for a rapid rail system is apparent.

John A. Volpe, Secretary of Transportation, has stated: "There are figures available that demonstrate very conclusively that without the Metro System you are going to have a city that will die -- I don't

SYNOPSIS -- Continued

mean just be stagnated, I don't mean just congested by fumes, or congested by traffic, but I mean really die in the sense that people will not be able to get around. And you'll have a Washington, D.C. area that is primarily 25 miles outside the city instead of in the city "

In this unit, the students will learn how and why the idea originated, how it is being implemented, the impact that it will have on the community, immediate and outlying, and the thousands of job opportunities that it will provide.

The topics in this cluster are:

1. Surface Transportation
2. Interstate Transportation
3. Air Transportation
4. Water Transportation
5. Subterranean Transportation (The Metro)

HIGH IMPACT ACTIVITIES:

1. Guided trip to Dulles, National or Friendship Airports.
2. Train ride to Baltimore.
3. Visit to the D.C. Navy Yard.
4. A Tour of the Metro Demonstration Center.
5. Vestiges of Transpo-'72, if still available.

COMMON RESOURCES:

1. Metro kits provided by Mr. Gerald Gough (484-2727)
2. Greyhound Public Relations Office
3. Aerial Map of the United States
4. Map of D.C. - Washington Post and/or Gas Stations.
5. U.S. Department of Transportation
6. U.S. Coast Guard

GRADE 8

CAREER CLUSTER MODULE

IV

TRANSPORTATION

Unit/Topic 1 - Surface Transportation

Topic: Surface Transportation

Purpose: To explore and obtain information on the opportunities and requirements for occupations related to surface transportation.

Main Ideas:

1. Man has always tried to find ways of transportation that would save him time and effort.
2. Transportation development reflects the rate of advancement of a city or a country.
3. A broader concept of city transportation with emphasis upon its positive aspects does much to act as an aid to transportation.
4. Without transportation our modern society could not exist. There would be less metals, coal, and oil, and goods or produce of one area would not be available in other parts of the United States where they are not manufactured or produced.
5. Transportation also affects our lives in many ways; for example, saving lives by transporting personnel and supplies in emergencies.
   (a) history
   (b) type
   (c) use

Individual and Small Group Quests:

1. Talk with supervisors in certain transportation areas regarding transportation facilities and the types of occupations available in those areas.

Career Opportunities:

1. Unskilled

garage attendant
loader
lubrication man
material handler
taxi driver
truck driver's helper
truck mechanic's helper
truck washer

2. Semiskilled

automobile salesman
bus driver
chauffeur
dispatcher
dockman
routeman
service station attendant

Career Opportunities -- Continued

ticket agent
tire agent
tire recapper
tireman
tracing clerk
truck driver, local yardman

3. Skilled

automobile service advisor
body repairman
driver training instructor
electrical unit repairman
insurance agent
liability claim agent
maintenance supervisor
mechanic (maintenance and specialist)
package express sales supervisor
parts department supervisor

4. Professional

city manager
equipment and maintenance management
general maintenance manager
highway construction engineer
mechanical engineer
traffic manager
transportation manager
urbanologist

Career Development Curriculum Guide: Grade 8
Transportation
Surface Transportation

LANGUAGE ARTS

Purpose:

To realize that the high standard of living in the United States is directly related to well-developed systems of surface transportation.

To explore job opportunities related to auto, bus, truck, and train transportation.

To understand the historical development of various modes of surface transportation.

To learn the pivotal role of verbs as transporters of ideas in our language.

Objectives:

Upon completion of work in this unit, the student should be able to:

1. Explain in forceful English, both in writing and orally, how surface transportation and high living standards are related.

2. Describe 8 - 12 jobs related to auto, bus, truck, and train transportation.

3. Trace in pictorial or verbal form the major steps in the historical development of auto, bus, truck, and train transportation.

4. Distinguish active, transitive verbs from the other kinds of verbs, e.g., intransitive, auxiliary, in syntactical patterns.

5. Explain the relationship of direct and indirect objects to verbs in our language.

6. Diagram noun - verb - object sentences using the new transformational grammar technique.

Activities:

To accomplish the objectives, the student may engage in activities such as:

1. See film, "Transportation in the Modern World" (University of Iowa) and write an essay showing how transportation affects living standards. Tie-in with Home Economics.

Activities -- Continued

2. Give individual reports to class on job descriptions in "Employment Outlook; Railroads and Driving Occupations."

3. See film, "The Motor Mechanic" (University of Iowa), and write summary of the technical aspects of transportation vehicles.

4. Write an imaginative autobiography of a person who has chosen a career in the transportation field: discuss satisfactions, rewards, as well as duties.

5. Read material on transformational grammar in Growth in English (or another modern text for junior high) with the teacher: take notes on how the generative grammarians describe the structure of basic sentences.

6. See film, "Transformational Grammar" (McGraw-Hill); of the "tree diagrams" used most recently to show subject - verb - object relationships in a sentence.

7. Work out (diagram) practice sentences supplied by the teacher, showing pivotal role of transitive verbs in our language. (These can be done in red pencil and displayed in the classroom.)

8. Quest: Bring in a report on one of the common activities in this unit.

9. Quest: Make a slide-tape presentation of one of the field trips in this unit.

Materials:

1. Films:
   a. See Activities 1, 3, 6 above.
2. Pamphlets
   a. Employment Outlook: Railroads (reprint from Occupational Outlook Handbook, 1970-71, DPO.
   b. Employment Outlook: Driving Occupations (Ibid.)
3. Books:
   a. Hand, Harsh, et al, Growth in English, Laidlow Brothers, 1972.
4. Ditto sheets of practice sentences for students to

Materials -- Continued

diagram (teacher made).
5. White and manila drawing paper for pictorial recaps on history of transportation modes.
6. Camera, film, tape for individual quests.

Tie-Ins with Career Related Skills:

Appreciation of workman's role, increased verbal competence, visual discrimination, muscular coordination, knowledge of new job opportunities, and improved judgment in job evaluation.

MATHEMATICS

Purpose: To show the students the many ways that mathematics relates to a successful transportation system.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Identify the elements in the set of integers.
2. Identify the additive inverse of a given integer.
3. Arrange in a specified order a give set of integers.
4. Determine the absolute value of a given integer.
5. Perform the fundamental operations with integers.
6. Locate a point in the coordinate plane when given an ordered pair of integers.
7. Use an ordered pair of integers to name a given point in a plane.
8. Perform the four fundamental operations using whole numbers, common fractions, and decimal fractions.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Listen to the teacher explain the areas of the District of Columbia in terms of positive and negative numbers; the teacher should explain the additive inverse and the absolute value using a map of D.C. Point out the need for a traffic system to control transportation.
2. Fill in the taxicab zones for the District of Columbia; then calculate the cost of a taxi ride from various places in the city to specific points of destination given the price per zone. Tie-in with Business.

Activities -- Continued

3. Given the per load price and the amount of time it takes to pick up and dump a load, calculate the amount of money a dump truck driver can earn in two weeks time based on the number of trips he can make per day. Tie-in with Business.

4. Given several points of origin and destination, determine how they would travel from one point to the next by bus and back, the total mileage involved, using the map of the District of Columbia and the bus route to and from, and the total cost of each trip. Tie-in with Business.

5. The teacher is to make up ten moving-van jobs with estimates of the amount of time that it takes to move each person. The teacher is also to establish the cost per hour. Students should calculate the job schedule in the ordinal sense, number of hours and days needed to accomplish all of the jobs, and the total amount of money earned from all jobs. Tie-in with Business, unions, labor, labor law.

Materials:

1. Map of the District of Columbia
2. Map of the Eastern United States
3. Map of the Zones in D.C. and taxicab rates
4. Information on wages for dump-truck driver
5. Information on moving van rates.
6. Films;
   a. "Freewayphobia", Parts I and II. Color Sound (30 min.) This film shows techniques of driving on super highways, and is presented in the interesting style of Walt Disney, with "Goofy" playing the part of four distinct types of freeway users. Available from: Allstate Insurance Company, 1819 Electric Road, SW, Roanoke, Virginia 24018.

SCIENCE

Purpose: To encourage pupils to greater use of the bicycle as a means of transportation as they grow older through a thorough understanding of its functioning and health benefits derived from its use.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Compute the mechanical advantage of various gear combinations found in bicycle wheels.
2. State how ball bearing reduces friction and demonstrate how to assemble ball bearings correctly in a bicycle wheel.
3. Select the correct size of a bicycle according to his own measurements.
4. Explain and demonstrate the gyroscopic property of a spinning wheel.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Discuss the bicycle as a means of getting from here to there easily and inexpensively. How much time does it save over walking? Riding the bus? Driving by car? Parking? How about air pollution? How much money does it save in the four instances above? List the responses on the board and star the most realistic ones. Pose the question: Why do some adults ride bikes in this city? Why do so many adults ride bikes in Holland and Denmark? Help pupils see the advantages of economy, parking space, speed, and healthful exercise. Tie-in with Social Studies, Physical Education.
2. Have a pupil demonstrate the adjustable parts on a bike for riding comfort and safety: handlebar tilt and height; saddle tilt and height. Give several girls practice in loosening the bolt and nuts to make the required adjustments for particular individuals. Tie-in with Industrial Arts.

Activities -- Continued

3. Turn the bike upside down to rest on its handlebars and saddle. Have a pupil use the pedal to turn one complete revolution of the back wheel. Ask the question: How far would this carry you along the road? Help them recall the circumference formula C = pi x d. Measure and multiply it out. Now have the pupil turn the pedal through one complete revolution. How far did the back wheel travel this time? Turn the bike right side up and slowly roll it through one complete turn of the pedal. Measure the distance travelled along the floor. Compare it with this formula for the distance or "pace" of the bike:

   $$\text{Pace} = \frac{\text{no. of teeth on the front sprocket}}{\text{no. of teeth on back sprocket} \times d \times pi}$$

   If carefully done the two should be equal. Boys' bikes usually have a 52-tooth front sprocket, girls' bike, a 44-tooth one. Which would be easier to pedal? Which would give you more speed? Tie-in with Mathematics.

4. Discuss with pupils the ease of riding a bike with "no hands" on the handle bars. Is it easier at a fast speed or a slow speed? Pupils who have tried it should affirm greater ease at a fast speed. Help pupils realize that this is due to the gyroscopic effect of the spinning wheels. Have a pupil remove a front wheel from a bike and using heavy gloves hold it by each side of the axle. Another pupil should give the wheel a fast spin while it is being held. The pupil holding the wheel should now try to turn it to the left or to the right. Feel how it tries to resist his effort. If he stands on a freely rotating platform the spinning bike wheel will cause him to turn in a circle. Use a model gyroscope to demonstrate its resistance to change of direction.

5. Quest: How is the gyroscope used in these forms of transportation: (1) ship? (2) airplane? (3) ship's compass?

Activities -- Continued

6. Disassemble the front wheel hub to locate the cones and bearings and bearing seats. Have pupils examine these parts to see the wrong direction and right direction to replace bearings in the front wheel. Tie-in with Industrial Arts.

7. Disassemble the pedal sprocket housing to show the similar cone and bearing arrangement to that of the front wheel. Ask pupils if they can see any similarity between the wheel and axle machine studied earlier and the pedal-sprocket relationship. What is its mechanical advantage?

8. Disassemble a coaster brake rear wheel only if you are an experienced bike mechanic or one of your pupils is. These parts have a precise relationship. The reference listed by John McFarlane is excellent (and humorous) on all bike parts.

9. Discuss with pupils the healthful benefits of the regular exercise provided by riding a bike. Bring in the findings of Dr. Paul Dudley White, heart specialist, and other doctors. Point out the higher incidence of heart disease among Black males over the normal figures for the entire nation recently made public by Dr. Johnson at Freedmen's Hospital, Howard University. The physical education teachers or a heart specialist might be brought in as a speaker. Point out that with the advent of Metro, streets may be less crowded and dangerous. Tie-in with Physical Education.

10. Quest: Research sizes/types of bikes available and how to choose correct one for leg length, size, sex.

11. Quest: Start a bicycle club for school. Plan Saturday or Sunday rides. Plan a riders' school to give lessons at lunch time and after 3 P.M. to pupils who have not learned to ride. Plan a bike rodeo with prizes for most skilled riders. Plan trips to the C. & O. Canal towpath, Mount Vernon, and other interesting places. Promote bike safety and bike care. Tie-in with Social Studies.

Materials:

1. Several working bicycles
2. Miscellaneous bike parts
3. Freely rotating stool
4. Cone wrench
5. Films - Advance notice required and borrower pays return postage.
   a. "Bicycle Rules of the Road" 16mm Sound (11 min.) This film, in full color, presents a highway patrol school demonstration which emphasizes driver reaction time and stopping distances of both autos and bicycles. Staged collision tests, using slow motion photography, forcibly demonstrate what happens when a car collides with a bicycle at 25 and 47 miles per hour. Available from: Employers Insurance of Wausau, Wisconsin in 54401.
   b. "Championship Bicycle Safety (RV-402)" 16mm Sound (13 min.) This film, in full color, relates the cycling skills of the champs to the skills needed in everyday cycling situations. Simple narration gets across the message that cycling is more enjoyable if it's done right. Especially good for scouting groups and youngsters in primary and secondary grades. (Cleared for television) Available from: Association-Sterling Films, 600 Grand Avenue, Ridgefield, New Jersey 07657.
   c. "If Bicycles Could Talk" (1967) 16mm Sound (13 min.) This film, in full color, tells the story of bike safety from the viewpoint of the bicycles themselves. Two damaged bikes "come to life" in a repair shop and dramatize the misadventures they had with careless and neglected young owners. A new bike has a happier story to tell. Its owner is thoroughly checked out in the 3 c's of cycling safety--consideration, care, and courtesy.
   Available from Aetna Life and Casualty, Public Relations and Advertising Department, Film Library, 151 Farmington Avenue, Hartford, Connecticut 06115.

Materials -- Continued

6. References:
   a. Bicycle Care. New York 17, New York: Bicycle Institute of America, 122 E. 42nd Street. Has bike maintenance chart. Free copies on request. Also copies of Bike Quiz Guide, Bikeways: The Homestead Story. Bike Fun, Bicycle Riding Clubs, 1959.
   b. Cycling. (Merit Badge Series), New Brunswick, New Jersey: Boy Scouts of America, 1969.
   c. "Gears." World Book Encyclopedia, The. 1970, Volume 8. p. 75-76.
   d. McFarlane, John W. It's Easy to Fix Your Bike, Chicago, Illinois: Follett Publishing Company, 1964. An excellent concise reference with many diagrams and some humor.

SOCIAL STUDIES

Purpose:

To make the students aware that man's mobility is one of the most important characteristics of his existence.

To point out the effect of transportation in the development of one's personality and to the molding of his social, economic, and political life.

To show how land development increased the need for improved surface transportation and created innumerable job opportunities.

Objectives:

Upon completion of work in this unit, the student should be able to:

1. Explain the meaning of surface (as opposed to air, water, subterranean) transportation and describe its present forms in the United States.
2. State the value of surface transportation to him individually and mankind in general.
3. Trace the history of surface transportation from its earliest forms to the advanced present forms.
4. Differentiate and evaluate for efficiency (speed), availability, economy and recreational value, the various forms of surface transportation in the Washington area.
5. List 5 to 10 job opportunities related to surface transportation.

Activities:

To accomplish the objectives, the student may engage in activities such as:

1. Define the words "surface" and "transportation."
2. List various forms (examples) of surface transportation.
3. Quest: Form a committee to research the foreign names for the terms listed on the board and indicate the location of the countries involved on the map. (The listing will be determined by the forms as given in Activity 2).

Activities -- Continued

4. Resource person: Invite a representative of the D.C. Transit to explain the organization and operation of the system. Have students ask previously prepared questions to obtain information comparing the system to that of other cities.

5. Make a bulletin board display of the many forms of surface transportation and prepare a report of their advantages and disadvantages.

6. Write an imaginative essay on what one day in each student's life would be like without the various means of land transportation (exclude walking). Also, think of services that require this facility in order to stay in business. Tie-in with Language Arts.

7. Make a display of key clippings and magazine pictures relating to land transportation. Tie-in with Art.

8. Discuss the problems brought about by mass surface transportation and what, if anything, is being done to alleviate them.

9. Group Quest: Make a time line showing the stages of the development of surface transportation. Possible tie-in with Activity 7.

10. Individual Quests: Research and report on the history and use of the following modes of transportation. Make models where possible. (Tie-in with Industrial Arts.)

    a. The sledge (a simple branch drawn behind a man or beast.)
    b. The travois (Indian), a fixed V-shaped framework of two poles fastened to a horse.
    c. The sled.
    d. The wheel (Sumerians). Note: three planks of wood, pegged together in a rough circle.

Activities -- Continued

Write a paper on the importance of the wheel to mankind.

e. The chariot.
f. The coolie-taxi in far eastern countries.
g. The model T.

11. Discuss the origin and development of the modern highway system as a necessary complement to the increased use of surface transportation.

12. Group Quest: In the saga of surface transportation man first harnessed his body, then that of the animal, next, steam, and finally the atom. A committee will research and report on the modes of transportation in each of these categories. Find as many examples as possible. (Note how burdens are carried in many of the underdeveloped nations of the world today.)

13. Individual Quests: Research and report on:

a. The Pony Express
b. Appalachian Trail
c. The Roman Road
d. The Royal Road of Darius the Great
e. The Camel as a Means of Transportation
f. Travel in early America
g. The travels of Marco Polo
h. Messenger (Mail) Service throughout history
i. Travel during the Middle Ages
j. The Santa Fe Trail
k. The history of the bicycle
l. The steam engine
m. The locomotive
n. The American railway system
   (1) Col. John Stephens railroad 1825
   (2) The story of the B and O Railroad
   (3) Merger union of the Central Pacific and the Union Pacific, May 10. 1869.
   (4) The Pullman car (George M. Pullman)
   (5) Amtrak
   (6) Auto-Train
o. The history of the motorcycle
p. The history of urban mass transportation

Activities -- Continued

q. The history of automobiles (American)
r. Foreign cars
s. Projections for future surface transportation (rapid transit)
t. The Story of General Motors or another automotive industry.

14. Field Trip: Visit the transportation exhibit at the Smithsonian.

15. List some job opportunities that have been rendered obsolete by advanced means of transportation.

16. Discuss how the entire American economy is dependent on the automotive industry.

17. List some job opportunities currently related to private and public transportation (class should pool knowledge on this).

18. Individual Quest: Research and report to class on the current freeway-rapid transit controversy in the Washington Area.

19. Individual Quest: Research and report on the history of the Grand Prix and other Auto races.

20. Individual Quest: Interview a car salesman and find out his techniques for success. Report to the class.

Materials:

1. Books
   a. Casner, Mabel and Gabriel, Ralph H. The Story of the American Nation, New York: Harcourt Brace, World, Incorporated, 1967.
   b. Fabre, Maurice. A History of Land Transportation, New York: Hawthorne Books, Incorporated, 70 5th Avenue, New York, 1963. $5.95.

Materials -- Continued

c. Firestone, Harvey S. Man on the Move. New York: G.P. Putnam's Sons, 1967 Library of Congress Catalog No. 66-25866.
d. Jamison, Andrew. The Steam-Powered Automobile (Air Answer to Air Pollution), Bloomington, Indiana: Indiana University Press, 1970. Library of Congress Card No. 78-108211.
e. Throm, Edward L. "Picture History of American Transportation," Popular Mechanics, 1952. (Available from Simon Schuster, 630 Fifth Avenue, Rockefeller Center. New York.)
f. Rubin, G. S. "Steam and Electric Autos," Editorial Research Reports, 2, No. 6, August 14, 1968, 585-601.

2. Free Materials:
a. American Trucking Association, 1616 P Street, N.W., Washington, D.C.
b. American Transit Association Transit Fact Book. American Transit Association, 815 Connecticut Avenue, Washington. D. C. 20006.

Notes:

Tie-Ins with Other Subject Areas

Language Arts - report on importance of surface transportation in the growth of urban centers.
Mathematics - determine length of travel time from various points using different modes of transportation.
Art - make a collage of pictures of different modes of surface transportation.
Science - explain the relationship between air pollution, surface transportation, and temperature inversion.

BUSINESS EDUCATION

Purpose: To explore the opportunities and requirements for occupations related to certain specific modes of surface transportation.

To give students an opportunity to become actively involved in decision-making situations concerning modes of surface transportation and travel.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Compare and contrast various advantages and disadvantages as well as cost factors involved in selecting a privately owned automobile vs. bus transportation as a way to get to work.

2. List a minimum of three occupations and corresponding requirements in bus transportation, car rental, or a taxicab firm.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Discuss informally the interesting places that they would like to visit; type them up in tabulated form.

2. Work in small groups using the list of suggested spots to visit, study maps of the city and nearby areas and determine the mileage and highways to selected designations. Tie-in with Mathematics.

3. Compare time and cost involved between reaching above designation via a bus or private automobile or rental car; plan this trip for one, two, and three persons. Report findings to entire group. Tie-in with Mathematics.

4. Participate in a teacher-directed discussion on automobile ownership, annual operating cost and insuring an automobile. Such terms as bodily injury liability, collision insurance,

Activities -- Continued

property damage liability, comprehensive insurance coverage, and depreciation should be introduced and defined.

5. Individual or group quest: Visit the bus terminal, car rental agency or taxicab company inquiring as to the office-clerical type jobs available.

6. Do research for and conduct a panel discussion on automobile safety regulations and licensing.

7. Individual or small group quest: Collect articles, ads, timetables, etc. and prepare a scrapbook on a trip you would like to take in the future.

8. Individual or group quest: Interview a bus driver, taxicab driver to learn of job requirements, opportunities, pay, etc. Report to class or write up for bulletin board display.

9. Individual or group quest: Give a flip-chart demonstration of highway and street signs.

10. Using a map of the District of Columbia, select a possible work location within the city. Working in teams, determine the advantages and disadvantages of using private or public transportation to reach this work location. Team leaders might debate their conclusions in front of the class. Tie-in with Language Arts.

11. Have a traffic officer visit the class so that students may ask questions about and become informed as to common traffic violations, safe-driving habits, etc.

Materials:

1. Books
   a. Crabbe, Ernest, Enterline, Herman and DeBrun, Joseph. General Business. New Rochelle, New York: South-Western Publishing Company, 8th edition, 1961 (units 7 and 9).
   b. Piper, Edwin and Gruber, Joseph. Applied Business Mathematics, New Rochelle, New York: South-Western Publishing Company, 8th edition, 1965. (Unit 9, Sections 43, 44 and 45).

Materials -- Continued

c. Wilhelms, Fred, Heimerl, Ramon, and Jelley, Herbert. Consumer Economics, New York: Gregg Division McGraw Hill Book Company, 3rd edition. 1966 (Unit 5, Part 19).

2. Maps
   a. "The World Makes An Automobile" (129.4) Automobile Manufacturers Association, Incorporated, 320 New Center Building, Detroit, Michigan 48202.
   b. Maps of Washington, D. C. and surrounding areas - available at gasoline stations and The Washington Post Company.
3. Films:
   a. "The Development of Transportation, Second Edition," MP-So-16mm 1 reel (11 min.). Available through Encyclopedia Britannica Films.
   b. "Transportation by Land." MP-So-16mm, 1 reel (12 min.), Alden Films, 5113 - 16th Avenue, Brooklyn, New York 11204. Rental fee $2.50.
4. Chart
   a. "Bulletin Board Chart on Automobile Insurance" (Free) Insurance Information Institute, 110 Williams Street, New York, New York 10038

Notes:

Tie-Ins with Specific Career-Related Skills

Skill in working with road maps and highway signs and regulations is important in occupations such as: bus driver, taxicab driver, truck driver, etc.

HOME ECONOMICS

Purpose:

To provide the students with information and experiences relating to occupations connected with surface transportation.

To show students the interrelationships that exist between surface transportation and home economics.

To acquaint students with the importance of surface transportation in our modern society since people could not function without it, nor could materials be moved without it.

Objectives:

Upon completion of work in this unit, the student should be able to:

1. List some of the employment opportunities related to both surface transportation and home economics.

2. List several facts relative to surface transportation pollution and its effect upon people and their surroundings.

Activities:

To accomplish the objectives, the student may engage in activities such as:

1. Visit a bus terminal, automobile display room, or travel agency, and compile a list of job opportunities observed.

2. Make a collage of the different types of clothing worn on various modes of surface transportation.

3. Write a brochure on the types of clothing that are most durable for traveling.

4. Role play people in the following situations:

   a. Sales person at a travel agency.
   b. Anti-pollution consultant in favor of bicycles.
   c. Dietitian in a travel restaurant.
   d. Sanitation inspector in a park or other recreation area.

Activities -- Continued

5. Make a bulletin board display of recent articles related to pollution connected with surface transportation. Tie-in with Science.

6. Make a collage of different modes of surface transportation. Select as many different colors and interior designs as you can find. Compare and contrast the design and style of American-made vehicles with those produced by other countries.

7. Display on your classroom bulletin boards the many different styles of attire worn for bicycling, and by truck drivers, train conductors, chauffeurs, cab drivers, and bus drivers.

8. Individual or group quests: Visit the restaurant in the local train station, the bus station, and a metro station. Compare and contrast the quality of meals, sandwiches, etc. at the various establishments.

9. Design and draw a floor plan for an eating establishment and customer lounge which you feel would be an improvement upon the existing ones. Justify your example over the present ones.

10. List the related home economics careers involved in Activity 9.

11. Observe and write a short essay on "How I Would Decorate the Minibus and the Sightseeing Bus to Make Them More Appealing to Shoppers and Tourists."

Materials:

1. Cardboard
2. Construction paper
3. Scissors
4. Magazines
5. Food or boxes, cans, etc.(to be used in role playing)
6. Articles of clothing
7. Paste, crayons, watercolors

Materials -- Continued

8. References, etc.
   a. Bus Facts. National Association of Motor Bus Owners, 1025 Connecticut Avenue, Washington, D.C. 20036 (5 copies free). Use official school stationery when making your request. Booklet contains basic facts of the motor bus industry and how it contributes to the highway passenger transportation field. Graphs and charts aid in illustrating trends of the industry.
   b. Teachers' Kit for a Study of Railroad Transportation. Association of American Railroads Building, Information Service, 19th and L Streets, NW, Washington, D.C. 20036. The Kit has two parts: (1) the Teacher's Manual, outlines for grades, etc. (2) 32 pictures 11 x 12 portraying railroad development, activities, occupations.
   c. Training School Bus Drivers. American Automobile Association and U.S. Office of Education Bulletin, #233, U.S. Government Printing Office, Washington, D.C. 20025, 30¢.
9. Film

   "Color, The Magic Touch" (2479) 16mm Sound (27 1/2 min.) This film, in full color, is the second part of a series about color that explains how tones of color can make a room smaller, larger, cooler, warmer, more comfortable or more formal. (Available to junior high level and above.) Advance notice required and borrower pays return postage. Order from: Association-Sterling Films, 600 Grand Avenue, Ridgefield, New Jersey 07657.

Career Development Curriculum Guide: Grade 8
Transportation
Surface Transportation

INDUSTRIAL ARTS

Purpose: To make students aware of new technology in transportation and the career opportunities related to this new technology.

Objectives: Upon completion of work in this unit, the student should be able to:

1. List the new forms now emerging in surface transportation.
2. State several ways in which this new technology will affect city life and life in suburbia.
3. Explain the function of the Department of Transportation.
4. List some of the careers related to new technology in surface transportation.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Individual Quest/Field Trips: Visit the Department of Transportation and obtain information on: amtrack, metroliner, autotrain, and monorail. Give oral or written reports to the class.
2. Group Quest/Field Trip: Visit Union Station: inspect the metroliner and talk to railroad personnel concerning it.
3. Prepare a layout map of the current route and stops of the metroliner to New York and the projected plans for monorail to Dulles Airport from downtown Washington, D.C. Tie-in with Mathematics, Social Studies, Art.
4. Research the Department of Transportation and report to the class on the vast overall government functions in transportation. Tie-in with Social Studies.
5. Write to one of the automobile companies and request information on "The Auto of Tomorrow" and "Roads of the Future." Tie-in with Language Arts.

Activities -- Continued

6. Build a small-scale layout of a metropolitan area showing transportation routes of the various forms of surface transportation. (models of Amtrak, Metroliner, Autotrain, Monorail, D.C. Transit, W.M. & A., Greyhound and Trailways.) Describe how these activities keep the metropolitan area alive and moving. Tie-in with Mathematics, Social Studies.

7. Write a report on the old and the new careers related to surface transportation.

8. Individual Quest: Visit the Autotrain and interview the president or another representative. Give a written or oral report.

Materials:

1. Plywood
2. Models of Amtrak trains, Metroliner and Autotrain
3. Modeling clay
4. Electrical supplies

GRADE 8

CAREER CLUSTER MODULE

IV

TRANSPORTATION

Unit/Topic 2 - Interstate Transportation

Topic: Interstate Transportation (ICC) (Department of Transportation).

Purpose: To explore opportunities in interstate transportation for employment.

To broaden concepts of interstate transportation by studying its history.

To learn the function and scope of regulatory agencies affecting interstate transportation.

Main Ideas:

1. To be able to list and explain about twenty jobs related to interstate transportation.
2. Name at least four types of interstate transportation and tell something about their history and importance to our everyday life.

Individual and Small Group Quests:

1. Design a truck, airplane, bus or train of the future.
2. Design and execute a collage with the wheel as the central theme.

Career Opportunities:

1. Unskilled

loader
material handler
track worker
yardman

2. Semiskilled

brakeman
carman
dispatcher
gang leader
locomotive fireman
manifest clerk
over-the-road driver
signal maintainer
station agent
telegrapher
ticket agent
towerman
tracing clerk

Career Opportunities -- Continued

3. Skilled

claims clerk
diesel mechanic
locomotive engineer
longshoreman
mechanic
sightseeing guide
travel agent
train hostess (porter)

4. Professional

civil engineer
industrial traffic manager
mechanical engineer
traffic engineer

LANGUAGE ARTS

Purpose:

To understand that the health of interstate commerce depends upon efficiency of interstate transportation.

To realize that interpersonal communication is a kind of commerce depending for its vitality on the quality of speaking/listening.

To learn some facts about the history of interstate transportation.

To explore jobs related to interstate transportation.

To develop some skill in applying principles of transformational grammar (see preceding unit) in oral situations.

To improve reading skill by conscious interpretation of words (verbs) bearing main ideas in sentences.

Objectives:

Upon completion of work in this unit, the student should be able to:

1. Explain both orally and in writing why interstate transportation is the key factor in healthy interstate commerce.
2. Be able to interpret the metaphor that interpersonal communication is a kind of commerce that is directly related to efficiency in speaking and listening.
3. Demonstrate knowledge about the history of interstate transportation by giving individual reports to the class.
4. List 10-20 jobs related to interstate transportation.
5. Pass a test on using clear-cut verbs in oral expression.
6. Show improved reading rate on material skimmed for important facts.

Activities:

To accomplish the objectives, the student may engage in activities such as:

1. Build a "Classroom Cassette Library" on transporta-

Activities -- Continued

tion using children's skills in oral/written English.

2. See films listed here to gather insights and information needed to make cassettes on transportation, particularly interstate transportation.

   a. "The Development of Transportation in the Modern World"
   b. "Completion of the First Transcontinental Railroad"
   c. "Transportation in the Modern World"

   NOTE: All above films are from University of Iowa.

3. Participate in a series of teacher-directed lessons on the Interstate Commerce Act (1887), and the establishment of the Interstate Commerce Commission: their relationship to interstate transportation. (A good source for teacher information or for brief photocopy data for handouts to students is "Teachers Annotated Edition," History of a Free People: New York, Bragdon and McCutchen, Macmillan, 1961).

4. Individual Quest: Do library research and prepare a report for the class on the history of interstate transportation.

5. Read the Occupational Outlook Handbook reprint, "Employment Outlook: Railroads": prepare a list of jobs with a brief description of the nature of the work to submit for credit.

6. See films listed here to gain understanding and skill in applying principles of transformational grammar to oral communication:

   a. "Grammar: Verbs and Ways We Use Them"
   b. "Verbs, Recognizing and Using Them"
   c. "Talking Ourselves into Trouble"
   d. "The Task of the Listener"
   e. "Why do People Misunderstand Each Other?"

   NOTE: Films available from University of Iowa.

7. Take timed-reading tests on written materials in this unit.

Activities -- Continued

8. Take oral English tests: questions on this unit can be written on cards, placed in sealed envelopes, and distributed at random to each student in the class. Student comes to the front of the class to respond: his performance can be evaluated both on content and conciseness (look at the choice of verbs).

9. Individual Quest: From a list of teacher-made topics on transportation, select one and write a three-minute cassette presentation (pay attention to the quality of verb structures).

10. Work in small groups listening to one another's cassette presentations for two major points: verbs and timing. Do this prior to recording.

11. Prepare cassettes (put speeches on the tapes and store for cluster culmination).

Materials:

1. Films (See activities 2 and 6 above).
2. Blank cassettes, one per student
3. Teacher handouts
   a. Xerox material on history of Interstate Commerce Act and establishment of the Interstate Commerce Commission.
   b. Individual unit questions for impromptu oral reports.
   c. List of unit topics for cassettes.
4. Multiple reprints: "Employment Outlook, Railroads"
5. Standard reference books (can use library) for research reports on unit backgrounds
6. Several tape recorders (cassette) for making tapes.

Notes:

Tie-Ins with Specific Career-Related Skills

Improved reading rate, perception skill (quick focus on verbs written in composition), efficiency in oral communication, general composition improvement, and self-confidence.

MATHEMATICS

Purpose: To show students the many ways that mathematics relates to interstate transportation.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Perform the four fundamental operations using whole numbers, common fractions, and decimal fractions.

2. Solve verbal problems involving whole numbers, common fractions, and decimal fractions.

3. Read scales of maps and measure the distance between two given points on the map.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Compare the cost of shipping an item of goods such as 50 lbs. of books from Boston to Washington, D.C. or 20 lbs. of oranges from Central Florida to Washington, D.C. by air freight, train, trucking service, and private automobile by calculating cost per lb. per mile. The teacher is to provide the information on the cost and/or information concerning the place where the prices may be obtained. The teacher and student are to calculate the total mileage for each type of vehicle using a map of the routes from Boston to Washington, D.C. and Central Florida to Washington, D.C. Tie-in with Social Studies.

2. Find out the means for calculating the cost of a taxicab ride from Washington, D.C. to a neighboring airport and vice versa. The students are also to calculate the cost of a taxicab ride from Silver Spring, Maryland to Washington, D.C. using pairs of points designated by the teacher.

3. Calculate the cost of travelling by D.C. Transit from places in Washington, D.C. to places in Maryland and vice versa as designated by the teacher. Compare the cost of travelling per minute using bus and using the taxicab.

4. Given the amount of money that overnight trailer

Activities -- Continued

drivers make per trip, calculate the amount of money that the driver earns in two weeks.

Materials:

1. Maps of District and the Metropolitan area
2. D.C. Transit map of the Metropolitan area
3. Map of the eastern United States Coastal States
4. Fares for D.C. Transit; interstate taxi rides
5. Cost of airport taxicab and limousine fares
6. Wages of overnight trailer drivers

SCIENCE

Purpose: To introduce the pupils to the working parts of a gasoline engine and to make the components of a gasoline mower, mini-bike, and automobile familiar enough to pupils that they can point these parts out on any engine shown them.

Objectives: Upon completion of work in this unit, the student will be able to:

1. Distinguish the following major components of a asoline engine and point out these individual parts by name and function:

   block: cylinder, piston, valve, gasket.
   carburetor: air cleaner, choke, throttle.
   radiator: filler cap, drain plug, hoses.
   battery: positive post, negative post.
   fan belt: generator (alternator), waterpump, power steering, air conditioner.
   exhaust manifold: muffler, tail pipe.
   distributor: points, coil, condenser, ignition wires, sparkplugs.
   transmission: universal joint, differential.
   wheel: brake drum, lining, bearings, grease seals.
   gasoline tank: fuel pump, carburetor.
   steering train: gear box, tie rods.
   chassis: torsion bars, coil springs, leaf springs, motor mounts.

NOTE: The teacher should have spare parts boxes available for accumulating junk from automobile engines. She should also get a discarded gasoline lawn mower and have it on display with parts labeled.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Talk with the teacher about the fastest, most economical, and convenient way to travel from Washington to a neighboring city (Baltimore, Richmond, Frederick) for a family of four. This should point to the family automoblile. Ask the question: "Have you ever taken such a trip and had the car break down?" List causes of the

Activities -- Continued

breakdowns. Pupils may suggest a flat tire, waterpump, generator, out of gas, etc. What did you have to continue your trip? List remedial actions taken. How much did it cost you? Would you like to learn more about cars to help you on your next trip?

2. Watch some transparencies projected by the teacher (these should be made by color-lift) of recent automobiles and views of engines and chassis. Assign pupils to bring in similar pictures cut from magazines and manufacturers' advertising. When pupils have pictures collected, point to each part using the overhead projected transparency and have pupils find and label that part on their own pictures.

3. Field Trip: Make a trip to the faculty parking lot with labeled pictures in hand. Raise the hoods on several of cooperating faculty members' cars and have pupils point out the parts on the actual engines.

4. Field Trip: Go on an auto junk drive around the neighborhood. Bring back all the scrap parts you can find. Sort these out on the laboratory tables and tie identifying name tags on all parts that are known. Look in automobile repair books to find the names of unknown parts. Ask the industrial arts teacher and other faculty members for assistance in identifying these.

5. Demonstrate an old gasoline mower engine. Name and label its parts. Disassemble the engine to reveal the cylinder head. Remove this to show the function of the piston, intake valve, and exhaust valve.

6. Make a block function diagram of the components of a gasoline mower engine. Divide into teams of two; quiz each other on the name and function of each part. Then challenge another team to a quiz match. Appoint other pupils (the uninvolved?) as scorekeepers. Have a playoff-quiz match between the two best teams before the class (day before a holiday).

Activities -- Continued

7. Pose the question. "How can road breakdowns be avoided?" Develop the idea of preventive maintenance from the pupils' answers. List simple tests to determine where the trouble might lie:
   dead battery - no lights or starter.
   no spark to the plugs - loose wire, coil, or condenser.
   bad fuel pump - no gas to carburetor.
   leaky radiator hose - puddles of water.
   leaking waterpump shaft - rattle and no water.
   master brake cylinder - spongy brake pedal.
   Develop other symptomatic tests from pupils' experiences.

8. Summarize this unit with various types of identification tests and function tests.

Materials:

1. Assorted wrenches and screwdrivers (socket wrenches are almost a necessity in this unit).
2. Kerosene or gasoline for cleaning oily, greasy parts
3. Old rags for wiping
4. Aprons
5. Films:
   a) #1017 - Twining (D.C.) "Engines and How They Work", B, (11 min.), I-S.
   b) "Cars in Your Life" NFBC, 1962 (30 min.), h-a, D.C. Public Library.
6. Books:
   a) Bendick, Jeanne. The First Book of Automobiles, New York: Franklin Watts, Inc., 1955.
   b) Carter, Ernest F. The Boys Book of Cycles and Motor Cycles, New York: Roy Publishers, Inc., 1966.
   c) Corbett, Scott. What Makes a Car Go?, Boston: Little, Brown and Company, 1963.
   d) Hyde, Margaret O. Driving Today and Tomorrow, New York: McGraw-Hill, 1954.
   e) Lent, Henry B. What Car Is That?, New York: E.P. Dutton and Company, 1969.
   f) McFarland, Kenton D. and Sparks, James C., Jr. Midget Motoring and Karting, New York: E.P. Dutton and Company, 1961.
   g) Vale, John W., Jr. Modern Automotive Engine Repair, New York: Prentice-Hall, Inc. 1954.

Materials -- Continued

h) Automobile Manufacturers' Association. Quest. What Does It Take to Make Your Car?, 320 New Center Building, Detroit, Michigan 48202.
i) Zim, Herbert S. What's Inside of Engines?, New York: William Morrow and Co. 1953. (From steam to rocket engines).
j) Weiss, Harvey, Motors and Engines and How They Work, New York: Thomas Y. Crowell Co. 1969. Steam, electric, gasoline, jet, and rocket engines.
k) deCamp, L. Sprague. Engines, New York: Golden Press, 1961. Man's use of power from the water wheel to the atomic pile.
l) Boumphrey, Geoffrey, Engines and How They Work, New York: Franklin Watts, Inc., 1960. Has excellent detailed but clear drawings.
m) Billins, Henry. Diesel-Electric 4030, New York: The Viking Press, 1950. It has a good section on trains' diesel engines and on the safety device: automatic block signal system.
n) Morgan, Alfred. The Boys' Book of Engines, Motors, and Turbines, New York: Charles Scribner's Sons, 1946. It has a good diagram and plans for building electric motors.
o) Dyke, Andrew L. Dyke's Automobile and Gasoline Engine Encyclopedia, Chicago, Goodheart-Willcox, 1943. 629.2 D
p) Motor Service's Automotive Encyclopedia, Goodheart-Willcox. 1962 629.2
q) Georgano, George N. (ed.), The Complete Encyclopedia of Motor Cars 1895 to the Present, Dutton. 1968. 629.22 G.
r) Frazee, Irving., Automobile Electrical Systems, Chicago: American Technical Society, 1956. 629.25 F.
s) Grouse, William. Automotive Transmissions and Power Trains, New York: McGraw, 1959. 629.22 C
t) Purvis, Jud. All About Small Gas Engines; How to Fix All Kinds of 2-Cycle and 4-Cycle Engines. Goodheart-Willcox, 1963. 629.22 P.
u) Wherry, Joseph H. Automobiles of the World. Chilton, 1968. 629.22 W.

Materials -- Continued

v) Walton, Harry. "The How and Why of Mechanical Movements; Exactly How Machines Work", Popular Science, Dutton. 1968.
w) Peet, Creighton. How Things Work, New York: Holt, 1941. 530 P.
x) Shockley, William and Gong, Walter A. Mechanics, Merrill, 1966. 531 S.
y) Harrison, C. William. Find a Career in Auto Mechanics; Putnam, 1964. 629.28
z) Taylor, Dawson. Your Future in the Automotive Industry: R. Rosen, 1963. 629.2 T
aa) Connor, J. Robert. A Job with a Future in Automotive Mechanics: Grosset and Dunlap, 1969. 629.28
bb) Crouse, William H. Automotive Mechanics, 6th ed., New York: McGraw-Hill, 1970. 629.28 C
cc) Buehr, Walter. Trucks and Trucking, New York: G.P. Putnam's Sons, 1956.
dd) Burleigh, David R. Piggyback, Chicago: Follett Publishing Company, 1962. Trucking Combined with railroading.
ee) Colby, Carroll B. Trucks on the Highway, New York: Coward-McCann, 1964.

SOCIAL STUDIES

Purpose: To show that the constitutional fathers demonstrated great foresight as well as wisdom when they concluded that the free flow of commerce was necessary to the growth and development of the nation as a whole. The states were specifically instructed not to impose any restrictions, tariffs, or otherwise on goods crossing state lines. A number of Supreme Court decisions later affirmed this constitutional mandate.

As a result, all types of commercial vehicles carry goods from coast to coast under the protective umbrella of the Interstate Commerce Act. The fact that this license covers surface, air and water transportation attests to the economic importance of a fluid transportation system.

At the conclusion of this unit, the students should know why this provision was necessary, how its implementation has contributed to the growth and development of our nation, and how government regulates interstate transportation; and how they can find employment in this industry if it appeals to them.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Define and discuss the meaning of interstate commerce or interstate transportation.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Research and report on how commerce was carried on under the Articles of Confederation.
   a. Develop a skit dramatizing what a person would encounter if he tried to haul goods from Washington to Boston.
   b. Trace the route on a map and designate students to act as tariff agents on the boundary line of each state. They would explain why they could not proceed without paying a tax.
   c. Discuss the effect these restrictions would have on production, trade, and the economic welfare of the country as a whole.

2. Collect and display pictures on the types of

Activities -- Continued

vehicles that are used in interstate transportation and are engaged in interstate commerce today. Indicate why a number of these vehicles have several license plates bearing the letters I.C.C.

3. Illustrate how federal authority was challenged by researching and reporting in the case Gibbons vs. Ogden which held that the federal government, not the State of New York, could regulate traffic on the Hudson River since its commerce "concerns more states than one."

4. Make a list of consumer items used by residents of the District of Columbia that are results of interstate commerce.

5. Select an item from this category and trace it from its point of origin to your home via a form of interstate transportation.

6. Resource person: Invite a representative from the Interstate Commerce Commission to explain how it functions.

7. Group Quest: Form a committee; research the Interstate Commerce Commission and prepare a panel discussion on a case that is under deliberation. Make a decision based on your findings.

8. Explain how freight transportation is being expedited by integrated land-sea-air transportation through the use of the modern "container." For example, the igloo containers, standardized big metal boxes, which are interchanged between train, trucks, ships and planes; the S.S. Container Dispatcher (all -container ship on her way to Europe).

9. Field Trip: Visit a freight yard and have the inspector explain how it operates. Make a list of the companies labeled on freight cars as they pass. Indicate on a map their place of origin.

10. Quest: Research and report on the R.E.A. Leasing Corporation which operates the National Railroad Piggyback Trail Pool.

Activities -- Continued

11. Quest. Research and report on the unions which represent interstate carriers.

12. Quest. Read "Moving Men," in Moneysworth (August 23, 1971), and report on tips to homeowners on how to avoid moving damage and losses.

13. From the Yellow Pages of the Telephone Directory, make a list of the names and addresses of firms engaged in interstate transportation. Send for free materials.

Materials:

1. Aerial map of the United States
2. Map of the United States
3. Yellow Pages of the Telephone Directory
4. Books:
   a) Casner, Mabel B. and Gabriel, Ralph. Story of the American Nation, New York: Harcourt, Brace and World, Inc. 1967.
   b) Dietz, Betty Warner. You Can Work in the Transportation Industry, New York: The John Day Company, 62 W. 45th Street.
   c) Firestone, Harvey. Man on the Move: The Story of Transportation, New York: G.P. Putnam's Sons, 1967.
   d) Pell, Claiborne. Megalopolis Unbound, New York: Frederick A. Praeger, Publishers
   e) Throm, Edward L. Picture History of American Transportation, New York: Simon and Schuster, Inc., 630 5th Avenue, 1967.
5. "Should You Be a Traffic Manager?", George P. Baker, Career Information Service, New York Life Insurance Company, Box 51, Madison Square Station, New York, New York 10010.
6. "Railroads: Their Origins and Problems," C.F. Adams, Harpers' 1969.
7. "Bitterest Fight: New Mass Transit vs. More Highways," Life, August 9, 1968.
8. "Will Success Spoil the Metroliner?", Business Week, October 18, 1969, p. 74-75.
9. Free Materials: Order from:
   a) American Society of Traffic and Transportation, Incorporated, 22 West Madison Street, Chicago,

Materials -- Continued

Illinois 60602.
b) American Petroleum Institute, 1271 Avenue of the Americas, New York, New York, 10020.
c) National Petroleum Refiners Association, 1725 DeSales Street, N.W., Washington, D.C. 20036
d) The Associated Traffic Clubs of America, 207 Pine Street, Seaford, Delaware 19973.

Notes:

Tie-Ins with Other Subject Areas

Mathematics - rates charged by selected interstate carriers; make chart reflecting your findings.
Language Arts - make a picture dictionary of terms and job opportunities related to a specific interstate industry.
Art - make a collage of interstate industries; example, railroads, chemicals, airlines, etc.
Business Education and Language Arts - write a paper explaining the use of the computer in interstate transportation.
Science - explain how a travel-lift crane and a diesel engine operate.

Career Development Curriculum Guide: Grade 8
Transportation
Interstate Transportation

BUSINESS EDUCATION

Purpose: To explore occupational opportunities in interstate transportation and to become familiar with the vocabulary associated with transportation jobs.

To become familiar with the regulatory agencies affecting interstate transportation.

Objectives: Upon completion of work in this unit, the student should be able to:

1. List the conditions that affect the liability of carriers.

2. Type a directory of jobs in the transportation services. Select one such job as a personal preference and explaining orally the reason for his selection.

3. Type key words in the field of interstate transportation from the teacher's oral direction. These technical words are to be spelled correctly. Examples are:

act of God	contract carrier
act of public authority	exempt carrier
act of public enemy	inherent nature of the goods
act or riot or strikes	interstate commerce
act of the shipper	interstate transportation
carload	local drivers
carriers' liability	material handlers
Civil Aeronautics Board	motor carriers
common carrier	multiple-rack car
consignee	over-the-road drivers
consignor	private carrier
consignment	transit
containerization	

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Study the cards distributed by the teacher to each student. Each card should contain a key word. Such words as those listed in Objective 3 would be included. Each student becomes familiar with the definition of his word before exchanging cards with other students. Cards are later placed on the bulletin board

Activities -- Continued

for review purposes. Tie-in with Language Arts.

2. Listen to teacher-directed discussions on: the importance of the Interstate Commerce Act, regulation of air transports; carriers' responsibility for goods in transit; how carriers limit their liability and rights of carriers. These topics could also be handled in small buzz sessions. Tie-in with Social Studies.

3. Indicate on a ruled paper form, placing a check mark in the appropriate column, why the carrier would not be responsible for certain causes of damages.

4. Brainstorm on a daily, informal basis the various jobs that are available in interstate transportation. These sessions will make up the content of a directory of job opportunities that students will later type.

5. Individual or group quest: Collect pamphlets and other advertisements describing the various services offered by interstate transportation companies.

6. List the methods of transportation used for freight shipments and the advantages and disadvantages of each.

7. Group Quest: Small group may report on the R.E.A. Express, its rates and services.

Materials:

1. Books:

   a. Beaumont, John A. and Langan, Kathleen. Your Job in Distribution, New York: Gregg Division, McGraw-Hill, 1968. (Parts 33 and 34 "Transportation Services and Jobs in the Transportation Services").
   b. Tyler, Elias S. and Corenthal, Eugene J. Materials Handling - Traffic and Transportation, New York: Gregg Division, McGraw-Hill, 1970. (Unit 6 Carriers, Part 17, 18, 19, 20).

Materials -- Continued

2. Pamphlets:

   a. "The Air Express Story", "The Railroad Story", and "Calvacade of Express". Railway Express Agency, Public Relations Division, East 42nd Street, New York, New York.
   b. "The Human Side of Railroading," 127.1. Association of American Railroads, Transportation Building, Washington, D.C. 20006.

3. Magazine:

   a. "The Trucking Industry - Highway to a Career." Kevin Kasunic. Occupational Outlook Quarterly, pp. 2-24. Summer, 1971. Further information is available from: American Trucking Association, 1616 P Street, N.W., Washington, D.C. 20036.

HOME ECONOMICS

Purpose: To help the students broaden their knowledge of the implications of home economics as it relates to occupations in interstate transportation.

To have the students know the types of interstate transportation, their importance and areas of specialization.

Objectives: Upon completion of work in this unit, the student should be able to:

1. State the importance of interstate transportation to the nationwide distribution of foods, fabrics, furniture, etc. from the point of origin ultimately to the consumer.
2. Explain the effect on prices of goods and services if each family were compelled to transport them from a specific geographic area to their homes.
3. Cite some of the techniques used to transport livestock and perishable products throughout the country.
4. Employ the vocabulary related to occupations in interstate transportation.
5. State how persons skilled in various aspects of home economics contribute to the comfort of travelers.
6. Identify some of the many career fields open for persons with home economic training.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Field trip: Visit a local airport or train station: observe the eating places, lounges, seating arrangements, etc.
   a. List the jobs of the various people who serve you.
   b. Describe the attire of the people who work there.
   c. List the duties of each job.
2. After the train station or airport visit, write ways in which these places could be made more attractive and interesting with different arrangements,

Activities -- Continued

decorations, and colors.

3. Read and discuss the booklet, "Crises. Transportation." Pay special attention to the illustrations.

4. Suggest and give examples of proper dress (comfortable, attractive) for people who are traveling.

5. Individual Quests: Research and report to the class:
   a. How it is possible for residents of Washington, D.C. to enjoy, for example:

      fresh meat products from stockyards in Onaha, Nebraska or Baltimore
      oranges from California and Florida
      Salmon and tuna from Washington and Alaska
      Flowers from Hawaii
   b. What techniques were used to preserve the above products.
   c. Some careers that make it possible for area residents to enjoy these products.

6. Arrange a list of articles and clothing which you would take on a trip of two weeks.

7. Estimate the expenses of a family of four for transportation, meals, lodging, and necessary articles which all family members would need for a one-week trip.

Materials:

1. Crises. Transportation. Caterpillar Tractor, Department A,B,2C, Peoria, Illinois. It calls attention to the serious nationwide transportation problem. It urges the citizens to examine the need for coordinated transportation systems in their communities. It is profusely illustrated. (5 copies free per teacher; use official stationery).

2. Railroads. Association of American Railroads, Public Relations Division, Transportation Building, Washington, D.C. (Ask for current bulletins about railroads).

Career Development Curriculum Guide: Grade 8
Transportation
Interstate Transportation

INDUSTRIAL ARTS

Purpose: To make students aware of the importance of interstate transportation, The Interstate Commerce Act, and the related career opportunities.

Objectives: Upon completion of work in this unit, the student should be able to:

1. List the kinds of interstate transportation under the control of the Interstate Commerce Commission and the leading industries.
2. Explain how each state is dependent upon interstate transportation for goods and services.
3. Identify goods (supplies, equipment, etc.) delivered to school through interstate transportation.
4. List some of the careers related to interstate transportation.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Write a research paper on the Interstate Commerce Act.
2. Construct a lay-out showing how goods in the west are needed in the east and vice versa, and show the role of interstate transportation.
3. Make a collage of the different vehicles involved in interstate transportation; list the occupations available in each mode of transportation.
4. Meet delivery trucks arriving at your school for several mornings: list the point of origin and the goods, supplies, or equipment being delivered. Interview one of the drivers as to wage, vacation, raise intervals, working conditions, sick and leave benefits provided by his employer. How many years must he work before being eligible for full retirement? Will his retirement be covered by a pension fund as well as the Social Security Act? What compensation is awarded to him in case of accidents while he is on the job? Should he be fatally injured in line of duty, what benefits are available to his survivors

Activities -- Continued

as a result of his employment with this company?

5. Record the above interview on cassettes and share it with the class. Ask each classmate to critique your interview in terms of grammar, appropriateness of questions, courtesy, etc.

6. Write job descriptions of some of the careers related to Interstate Transportation.

Materials:

1. Tape recorder
2. Cassettes
3. Note pads, art supplies
4. Magazines
5. Films:
   a. "To See Ourselves" (1960) 16mm Sound (14 1/2 mins.) This film in full color tells the story of Jim Morrow, who has more than his share of annoying experiences during his drive to work one morning. He puts most of the blame on the other fellow; then, through the magic of the camera, he is allowed to see himself as others see him. Available from Aetna Life and Casualty. Public Relations and Advertising Department, Film Library, 151 Farmington Avenue, Hartford, Connecticut. Pay return postage and order two months in advance.

   b. "The Sixty-Minute Circle" (1180) 16mm Sound (24 1/2 min.) This film, in full color, shows the history of urban development from coast to coast. In the short span of half a century, our transportation revolution has created a new pattern of urban living. Ten weeks advance booking; borrower pays return postage. Available from: Association-Sterling Films, 600 Grand Avenue, Ridgefield, New Jersey 07657.

GRADE 8

CAREER CLUSTER MODULE

IV

TRANSPORTATION

Unit/Topic 3 - Air Transportation

Topic: Air Transportation

Purpose: To acquaint each student with the various opportunities for employment available in Air Transportation and how it affects our travel.

To make students aware that there are three airports in the Washington Metropolitan Area, each working three shifts and employing thousands of people.

Main Ideas: The students will become aware of the great economic factors of air transportation and its influence on our lives:

a. freight
b. commercial flights
c. under twenty-one clubs (student rates)
d. family rates
e. chartered flights

Individual and Small Group Quests:

1. Group Project: Make a chart on which you indicate the regular fare, family rate, and student fares to any ten of the major cities of the United States.
2. Make a video tape and taped narrative of a visit to Friendship, National or Dulles International Airports.
3. List ten careers connected to air transportation.

Career Opportunities:

1. Unskilled

airplane cleaner
airplane fueler
reservations record clerk

2. Semiskilled

air freight information clerk
ground hostess
load planner
metereological clerk
ramp information clerk
reservation agent
ticket sales cashier

Career Opportunities -- Continued

3. Skilled

aero-space technician
air freight supervisor
air traffic controller
airframe and power plant mechanic
baggage supervisor
crew scheduler
electroplater
flight dispatcher
flight movement estimator
ground equipment maintenance manager
instrument electrician
instrument mechanic
passenger services agent
stewardess

4. Professional

aeronautical engineer
airline pilot and copilot
flight engineer
metereologist
navigator

Career Development Curriculum Guide: Grade 8
Transportation
Air Transportation

LANGUAGE ARTS

Purposes:

To explore the many job opportunities in civil aviation.

To appreciate the costs of air transportation.

To understand the unique values of surface transportation in comparison with air commerce.

To improve overall language skills as avenues of entrance into jobs studied in this unit: speaking, grammatical usage (oral and written), writing, reading for detail.

Objectives:

Upon completion of work in this unit, the student should be able to:

1. Describe the nature of work done by at least twelve different kinds of workers in air transportation.
2. List several of the factors that make air transportation expensive.
3. Compare with relative objectivity the air and surface movement of goods in the American economy.
4. Demonstrate improved skill in total language competency.

Activities:

To accomplish the objectives, the student may engage in activities such as:

1. Field Trip: Visit a commercial airport and record what each worker is doing.
2. Following the teacher's pre-arrangement, interview an air transportation worker whose occupation seems attractive.
3. Individual Quest: Prepare a five-minute cassette recording of the interview and share it with the class.
4. Individual Quest: Prepare a research report

Activities -- Continued

from library reading on comparative costs in air/surface transportation and on the role of the FAA.

5. Make a mini-notebook on air transportation: send to major airlines for advertising folders on freight and passenger rates. Cut and paste pictures of various aircraft in use; indicate costs of travel and shipments, describe jobs of all persons involved in commercial air transportation. Submit for bulletin board display, teacher evaluation, and prizes. Tie-in with Mathematics, Business Education.

6. Make a 16" x 24" illustrated chart showing qualifications, earnings, advancement for each of the twelve jobs studied in this unit. (Illustrations can be cut-and-paste materials from large advertising folders available from airlines).

7. Gather information for an illustrated wall chart (see above) from reading Occupational Outlook Handbook, "Employment Outlook, Civil Aviation."

8. Participate in tests of total language competency prepared by the teacher.

9. See film: "Airport in the Jet Age" (University of Iowa) to realize what high-level skills (both technical and linguistic) are required in civil aviation today. Have students make list of new words noted.

10. See two films listed here to support interest in using effective verb-conscious English and also to give information about debating.

    a. "Making Language Appropriate and Effective" (U. of Iowa).
    b. "Learn to Argue Effectively" (U. of Iowa).

11. Organize debate teams: prepare debates for the class on the question, "Resolved: Surface transportation is superior to air transportation."

Materials:

1. Teacher handout of 12 jobs to be studied thoroughly in this unit
2. Large colored posterboard (one per student) for illustrated wall chart
3. Tape recorder for every six students
4. Poster paints; multiple sets with brushes for class use
5. Library references for research reports
6. Thin, spiral bound blank sheets (one set per student) for "Mini-notebooks on Air Transportation"
7. School stationery, envelopes, stamps for writing to major airlines for advertising folders
8. Stock pile of colored advertising folders if available when unit is launched
9. Teacher-made tests of factored language competency
   a. speaking skill (debate evaluation)
   b. reading
   c. transformational analysis (tie-in with two former units in this cluster)
   d. outlining
   e. minibook work: composition skill

Notes:

Tie-Ins with Specific Career Related Skills

Self-confidence in oral English, reading proficiency, skill in argumentation, composition skill, perceptual-motor efficiency, and an appreciative attitude towards jobs in air transportation are invaluable in such careers as aircraft mechanics, airline dispatchers, air traffic controllers, flight engineers, ground radio operators and teletypists, pilots and copilots, sky detectives, stewardesses, traffic agents and clerks.

MATHEMATICS

Purpose: To show the students the necessity of mathematics in air travel.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Identify elements of the set of rational numbers through scale reading on maps.
2. Identify the additive inverse for a given rational number using the notion of round-trip distances.
3. Identify the reciprocal of a given rational number using scale reading on maps.
4. Perform the four fundamental operations with rational numbers.
5. Demonstrate that any natural number, whole number, or integer may be expressed as a rational number.
6. Demonstrate order and density for rational numbers.
7. Demonstrate that every rational number has a decimal equivalent which is either terminating or a repeating decimal.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Calculate the amount of time that it takes an airplane such as the Boeing 747 to travel between any two given points as designated by the teacher. The teacher and/or students are to find out the speed of the airplane or airplanes to be used and the amount of fuel that its tank(s) can hold. Some examples of airplanes are Boeing 707 and 747, McDonnell-Douglas DC-8 and DC-9. The teacher is to designate several trips for the planes to make without refueling

Activities -- Continued

and the students are to determine if the airplane(s) can make the trip. The students are also to determine where refueling will have to occur, if applicable. Be sure to include Washington, D.C. to New York as a pair of points.

2. Investigate with the teacher the length of the runway needed for the various airplanes, to observe whether there is a relationship of proportionality between the plane size and the length of the runway. Tie-in with Science.

3. Obtain information on the cost of commercial flights, student rates, family rates, and chartered flights for three different pairs of points. Compare the cost of a roundtrip ticket to two one-way fares to and from; student rate to straight fare; and family rates to student rate and to straight fare; and chartered flight to straight fare. Tie-in with Business Educations.

4. Compare the time of air travel to train, bus, private automobile travel for the same pair of points. (Time means leaving home to reaching destination in all cases).

5. Given the maximum weight of luggage per passenger by your teacher, calculate the total weight of luggage permitted on each airplane designated by the teacher.

Materials:

1. "Airplanes." The World Book Encyclopedia, 1972, 1, pp. 194-242.
2. Map of the United States
3. Information on fare rates for straight fare, family, and student rates.

Career Development Curriculum Guide: Grade 8
Transportation
Air Transportation

SCIENCE

Purpose: To give students an understanding of what makes an airplane stay up and what moves it through the air.

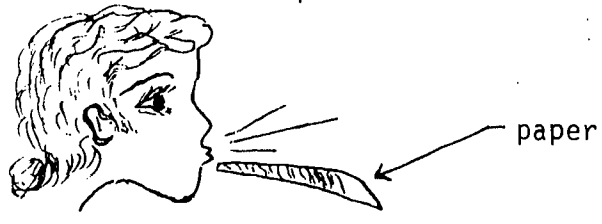
Objectives: Upon completion of work in this unit, the student should be able to:

1. Demonstrate at least one device to show lift.
2. Demonstrate and explain Bernoulli's theorem applied to moving columns of air.
3. State the primary difference between propeller-type, jet, and rocket engines.
4. Demonstrate and explain Newton's third law of motion.

Activities: To accomplish the objectives, the student may engage in activities such as:

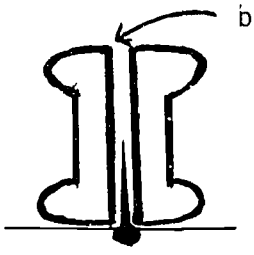
1. Listen to a lecture on the uses of gasoline motors and bicycles. "Have any of these devices been used to carry man through the air?" When the class affirms this, help them recall the great weight of motor parts. How do airplanes which are so heavy get up into the air and stay there? Develop with them the idea of the force called gravity measured in pounds or grams. Demonstrate that unbalanced air pressure can make things float upward in our ocean of air despite gravity:

   a. Use a dangling sheet of notebook paper held under the lower lip and blow hard over its



surface. What makes it rise?

Activities -- Continued



b. Demonstrate the card, pin, and spool trick: to the effect that although the card and pin would normally fall to the floor held in the position shown, when a person blows hard through the hole in the spool the card remains in place.
c. Demonstrate that a stream of air from a vacuum cleaner exhaust will keep several ping pong balls or a plastic beachball floating in its current of air. Discuss these phenomena. Have pupils try to diagram what is happening in each case with the flow of air.

2. Hear reports on the assignments. Make a large diagram of a wing cross section and show the unbalanced air pressure due to the camber of the wing. Put in number values. Find the area of the hypothetical wing and the total lift force for the entire wing. (help the pupils recall the formula for the area of a rectangle and how to use it).

   a. $A = lw$
   b. Total LIFT = A x difference in air pressure per $in.^2$ (square inch)

3. Quest. Have a pupil build a table model wind tunnel using a small electric motor and carved wood propeller blade to test the lift of various model airplane wings.

   a. How does the helicopter rotor replace the wings of other aircraft?

4. Thrust: Is an electric fan like an airplane propeller engine? Why doesn't the fan take off and fly? Could the fan be made to move along the ground? Demonstrate an electric fan moving itself across the table top when turned on and mounted on a pair of ball-bearing roller skates. Help pupils see that the fan blades are like threads of a screw and that the blades twist their way through the air like a screw going into wood. (A screw is a circular inclined plane).

Activities -- Continued

a. Quest. In what ways are gasoline engines that power aircraft similar to and different from automobile engines? Make comparison diagrams and charts.

5. Since a jet engine has no propeller how does it thrust its way through the air? After discussion let pupils blow up balloons and release them. (CAREFUL !) Fire a CO_2 cartridge plane. Fire a jetex rocket motor mounted on a plane or guide wire. Have a pupil stand on roller skates on the hard top or classroom floor with skates parallel and throw bricks at a backstop. What happens to the brick and what happens to the pupil? What is happening inside the engine or to the boy that makes the whole thing move in the opposite direction?

   HOMEWORK: Look up Isaac Newton's third Law of Motion.

6. Quest. Look up all of Isaac Newton's Laws of Motion; report on and give a demonstration of each of these laws to the class.

   Demonstrate with models and a diagram what the parts of a jet engine are. Have pupils make a diagram of these parts. What is the difference between a rocket and a jet? Use diagrams and models. Fire another jetex rocket or CO_2 cartridge rocket. Why is it easier to make a miniature rocket than a miniature jet engine? Distinguish between solid propellant and liquid fuel rockets.

7. Quest. Summarize lift and the moving wing. Summarize thrust by means of propeller, jet, and rocket. Summarize the differences between gasoline engines for cars and for aircraft.

Materials:

1. Pair of roller skates (ball-bearing)
2. Powerful table model electric fan

Materials -- Continued

3. Jetex rocket engine and igniter (hobby shop)
4. Airplane propeller
5. Model wind tunnel and wing cross sections, if available
6. Films (Twining Media Center, D. C. Public Schools)
   a. #941 "Airplanes - How They Fly" B, (11 min.) P-I
   b. #2046 "Frontiers In Space" B, (15 mnn.), S
   c. #2050 "Space Travel" B, (15 min.), S.
   d. #1694 "Science in Space" B, (27 min.), S
   e. #1332 "Ocean of Air, The" B, (14 min.), S
   f. #1227 "Gravity - The Mighty Pull" B, (14 min.), I - S
   g. #1056 "Rockets - Principles and Safety" B, (11 min.) I
6. Books
   a. Boumphrey, Geoffrey. Engines and How They Work, New York: Franklin Watts, Inc. 1960.

Notes:

Tie-Ins with Other Subject Areas

Mathematics - lift force in pounds per square inch times area of surface
Social Studies - contributions of Sir Isaac Newton to science and philosophy; also Daniel Bernoulli - history of man's efforts to fly.
Industrial Arts - building cross sections of model airplane wings; build model planes, build a wind tunnel.

Career Development Curriculum Guide: Grade 8
Transportation
Air Transportation

SOCIAL STUDIES

Purpose: To assist the students in understanding that air transportation is one of the fastest growing industries in the United States and worldwide.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Describe several ways in which the aircraft industry serves the consumer by providing swift efficient transportation all over the world.
2. Identify several types of commercial aircraft in use today.
3. List critical events in the history of the airplane.
4. State several ways the Federal Government supervises the air industry.
5. State some of the many job opportunities related to air transportation.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. List and discuss the advantages and disadvantages of flying in comparison with other modes of transportation.
2. Research and discuss how the airlines serve the community.
3. Individual Quest: Research and report to the class on the Wright brothers and the importance of their invention.
4. Field Trip: Visit the Smithsonian to view the early aircraft.
5. Construct a bulletin board on travel documents and posters.

Activities -- Continued

6. Individual Quest: Research and report to the class on the government regulations regarding air travel.

7. Develop a list of at least 12 occupations related to air transportation.

8. List some of the imports that are transported to the United States by air.

Materials:

1. Books
   a. Casner, Magel and Gabriel, Ralph. Story of the American Nation. Harcourt Brace and World. New York. 1967.
   b. Dietz, Betty W. Transportation Industry. The John Day Company, Inc. 62 West 45th Street. New York, 1969.
   c. Munson, Kenneth. Civil Airliners. Macmillan Co. N. Y., 1967.
   d. Pell, Claiborne. Megalopolis Unbound. Frederick and Prager Inc. 114th Avenue, New York, N. Y. 10003.
   e. Roseberry, C. R. The Challenging Skies. Doubleday and Company Inc., Garden City, N. Y., 1966.
   f. Throm, Edward L. Picture History of American Transportation. Simon and Schuster, New York, N. Y., 1952.

Career Development Curriculum Guide: Grade 8
Transportation
Air Transportation

BUSINESS EDUCATION

Purpose: To give students an opportunity to become aware of the many services and jobs available in air transportation by letting them participate in simulated experiences concerned with making travel arrangements.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Prepare a typewritten itinerary, outlining a typical trip for a business employer.
2. Answer orally specific questions relating to airline flight schedules and fares by referring to the official airline guide.
3. Type address labels for packages and compute express rates for goods being sent by air express.

Activities: To accomplish the objectives, the student may engage in activties such as:

1. Have hands-on experiences in working with reference books or guides that would be of particular help in planning a trip for a future employer.
2. Participate in an informal buzz session on the following type of questions:
   a. What are some possible advantages and disadvantages of plane travel vs. railroad travel?
   b. How do the first-class and economy-tourist accommodations on planes differ?
   c. What purpose does an itinerary serve?
   d. What information should be included in a letter to a hotel asking for a reservation?
3. Role-play making air travel reservations for an employer through a specific travel agency as well as directly with an airline.

Activities -- Continued

4. Type sample itineraries from various typewriting tests.

5. Write letters requesting hotel reservations, consulting the Hotel and Motel Redbook. Tie-in with Language Arts.

6. Field Trip: Visit National and/or Dulles Airports and observe and interview personnel handling ticket reservations. Report the findings to the class.

7. Conduct class discussions on how clerical personnel and airline stewardesses have similar responsibilities.

8. Resource Person: Invite a person from a travel agency or airlines to talk to the class about the specific services they provide to travelers.

9. Individual/group quest. Call an air express office to obtain detailed information about the rates and services of air express.

10. Referring to airline and railroad fares between major cities, find comparative costs of travel between different cities for different types of accommodations.

11. Type air express receipt forms for shipments to be sent by express.

12. From rough notes prepared and distributed by the teacher, students type in logical order an itinerary.

13. Type in tabulated form in alphabetical order the names of airlines in the United States.

Materials:

1. Books
   a. Fries, Rowe and Travis. Applied Secretarial Practice, New York: Gregg Division, McGraw-Hill, 6th ed. Unit 12: "Travel"

Materials -- Continued

b. Rowe, John L., Lloyd, Alan, and Winger, Fred E. Vocational Office Typing Gregg 2, New York: Gregg Division McGraw-Hill, 191 Series, 2nd ed. (Part 3 Unit 9: "Business Office" Laurence Mayo Co.), 1967.

2. Pamphlets
   a. "Your Career with the Airlines" (611), Air Transport Association of America, 1000 Connecticut Avenue, N. W., Washington, D. C. 20036.
   b. "You and the Air Age," Northwest Orient Airlines, 2110 Rand Tower, Minneapolis, Minnesota.
   c. "Aviation's One World in the Jet Age," 306.1, Pan American World Airways, Incorporated, Pan Am Building, New York, New York 10017.
3. Bulletin Board Material
   a. "Your Mainliner Flight Picture Set", United Airlines, 5959 South Cicero Avenue, Chicago, Illinois.

Notes

Tie-Ins with Specific Career-Related Skills

Skill in making reservations and handling ticket information is important in occupations such as: secretary, airline ticket agent, confirmation clerk, and travel agency personnel.

Career Development Curriculum Guide: Grade 8
Transportation
Air Transportation

HOME ECONOMICS

Purpose:

To promote an understanding of the influence that air transportation has on one's daily life, and to show the part home economics plays in this.

To explore the many job opportunities in the area of air transportation.

Objectives:

Upon completion of work in this unit, the student should be able to:

1. Identify areas of air transportation where home economics training is required.
2. Write a short report on the many opportunities available for careers related to air transportation.
3. State the importance of good grooming, charm, poise, and graciousness in the career of an airline stewardess.
4. List the advantages of air travel and shipping.
5. Explain how air travel is beginning to reach people on every economic level.

Activities:

To accomplish the objectives, the student may engage in activities such as:

1. Field Trip: Visit the Smithsonian Institute and compare the airplane interiors of the past to the luxury jetliners of today.
2. Field Trip: Individual or small group quests: Visit the National or Dulles Airports. Write a description of the decorations in the dining areas, lounges, and boarding sections. Tie-in with Art.
3. Observe and tape a critique of the uniforms of the stewardesses of the various airlines. Comment also on their demeanor, poise, grooming and tact. Share it with the class.

Activities -- Continued

4. Explain some advantages and disadvantages of air travel.

5. View and discuss the film: "Traveler Meets Air Traffic Control."

6. Divide the class into small groups to perform the following activities:

   a. List some of the activities at the airport.
   b. Select an activity and design outfits for the persons involved.
   c. Plan a meal for a luncheon flight.
   d. Dramatize a stewardess giving instructions to the customers prior to landing.

7. Make a scrapbook of at least ten home-economics related careers in the field of air transportation. Give short descriptions of each career.

Materials:

1. Film
   a. "Traveler Meets Air Traffic Control,": A(FA-102) (1963) 16mm Sound (33 min.) Color. Depicts departure, en route, and arrival, air traffic control services, provided to a jet air carrier which leaves Chicago's O'Hare Airport and lands at Los Angeles International Airport. Book three weeks in advance; no postage. Order from: Federal Aviation Administration, F.A.A. Film Library, AC-921., P.O. Box 25802, Oklahoma City, Oklahoma 73125.
2. References
   a. "Aviation's One World" - a guide book. It has reference collections explaining international air transportation in terms of a flight around the world. Fully illustrated with maps and pictures, classroom projects and activities are suggested, 28 pages. Single copies to teachers free; use official stationery. Pan American World Airways, Education Department, Pan American Buidling, New York, New York 10017.

Materials -- Continued

b. "Los Angeles International Airport in Pictures." Eight black and white prints (8 x 10), scenes at the airport. Single copies available to teachers; use official stationery. Los Angeles Department of Airports, Public Relations Division, Worldway, Los Angeles, California 90009.

c. Employment Opportunities in Aviation Occupations (duties, qualifications, earnings, and working conditions). Bureau of Labor Statistics Bulletin, 837-2. U. S. Government Printing Office, Washington, D. C. 20025

d. Motor Truck Facts. Automobile Manufacturers Association, Detroit, Michigan. Annual. Free.

e. Guide to the Engineering Professions in the Aviation Industries. Institute of the Aeronautical Sciences, Incorporated, 2 East 64th Street, New York, New York 10021.

Career Development Curriclum Guide: Grade 8
Transportation
Air Transportation

INDUSTRIAL ARTS

Purpose: To acquaint the students with career opportunities available in air transportation.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Identify various career opportunities available in air transportation.
2. Explain the tremendous demand for air transportation.
3. Explain the role that the F.A.A. plays in air transportation.
4. Make model airplanes (DC-10, 707, 727).
5. Identify the advertising and graphic arts technology used by the airlines.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Write a job analysis of the various careers related to air transportation.
2. View audio-visuals on the various training programs (supplied by the airlines).
2. Write a paper on the effects the airlines have on the movement of human beings. Tie-in with Social Studies.
4. Field Trip: Visit the F.A.A. and C.A.B. and report on how they regulate the activities of the airlines.
5. Build model airplanes depicting size, number of passengers, conveniences, and kinds of airports used. Tie-in with Science, Social Studies.
6. Field Trip: Visit the local airline offices and secure advertising information (large silk-screen display and other graphics used by the airlines).

Activities -- Continued

7. Field Trip: Visit Dulles International Airport; board a DC-10, 707, 747, and 727 and talk with a captain, stewardess, co-pilot, mechanics and other flight personnel.

Materials:

1. Model kits
2. Brochures from the airlines
3. Audio-visuals from airlines

Topic: Water Transportation

Purpose: To introduce the students to the various job opportunities in Water Transportation.

To show how water transportation has a great impact on American life (shipping of goods and services, travel, etc.) and opens up many possibilities for employment.

Main Ideas: Because of the increasing amount of competition between the various modes of transportation, the moderate rates of tours on cruise ships make travel by water a possibility for those on a very moderate economic level. Further, there exists many possibilities for employment on sea-going vessels. Private boats are becoming more prevalent for relaxing and therapeutic reasons.

Individual and Small Groups Quests:

1. Field Trip: Visit the Tidal Basin and ride the waterbikes and the tourist boat "The Swan".

2. Field Trip: To Williamsburg, Yorktown, Newport News Ship Yard, Maritime Museum and return via Chesapeake Bay Tunnel and Annapolis Bridge.

Career Opportunities:

1. Unskilled

   galley worker
   messman
   oiler

2. Semiskilled

   deck-engine mechanic
   deck utility man
   fireman/watertender
   ordinary seaman
   reefer engineer
   riveter

3. Skilled

   able seaman
   assistant engineer

4. Professional

   chief engineer
   chief mate

Career Opportunities -- Continued

3.
- boat builder
- boat repair technician
- boatswain
- chief cook
- chief steward
- helmsman
- marina operator
- marine safety inspector
- purser
- quartermaster
- radio officer
- second mate
- shipfitter
- ship's carpenter
- ship's electrician
- signal man
- travel agent

4.
- deck officer
- first mate
- nurse
- physician
- ship's captain
- ship engineer

GRADE 8

CAREER CLUSTER MODULE

IV

TRANSPORTATION

Unit/Topic 4 - Water Transportation

LANGUAGE ARTS

Purpose:

To understand the unique values of transportation by water.

To realize that moving men and goods by water has a long international history.

To learn some of the job opportunities related to water transportation.

To develop new English skill, especially in the use of contrast and in coherent narration.

Objectives:

Upon completion of work in this unit, the student should be able to:

1. Tell orally and in writing why water transportation is needed in addition to air and surface modes.

2. Present in sketch or in essay form a review of important events in the history of water transportation.

3. Present a short narrative (orally or in writing) on the story of travel by water.

4. Using the vocabulary of contrast, bring out the differences in using air, surface, and water transportation of commercial goods.

5. Give the story line of narratives about water transportation.

6. Give coherent reviews of field trips taken in this unit.

7. List job opportunities related to water transportation.

Activities:

To accomplish the objectives, the student may engage in activities such as:

1. See the following films to gather data on the history of water transportation in the United States:

Activities -- Continued

a. "Flatboatmen of the Frontier (1790-1820)" (U. of Iowa)
b. "The Ohio River: Background for Social Studies" (U. of Iowa)

2. See these films to establish the universal values that are unique to water transportation:

   a. "An Island Nation, Japan" (U. of Iowa)
   b. "The Panama Canal: Gateway to the World" (U. of Iowa)
   c. "The St. Lawrence Seaway" (U. of Iowa)

3. See the film, "Transportation, America's Inland Waterways," (U. of Iowa) to realize the extent to which water transportation is used in the United States of America.

4. Bring in library/research reports on the various jobs available in water transportation.

5. Using a teacher-handout on stories related to the world development of water transportation, read a selection and prepare a coherent narrative based on it for the class.

6. On the cassettes used in the preceding three units, each student record a coherent review of his favorite field trip this unit.

7. Participate in a series of teacher-planned lessons on the use of contrast words, transforms that describe, and how to maintain coherence in communication.

8. Following a group research lesson in the library, work with the teacher in making a large chart showing all job opportunities related to water transportation which the students discovered.

9. Take an "entrance test": upon entering the classroom, each student must give orally to the teacher one point of contrast between water transportation and one of the other modes.

Activities -- Continued

10. Enjoy stories related to water transportation in class reading periods.

Materials:

1. Cassettes used in previous units
2. Wall-size poster board for class list of jobs in this unit
3. Films listed in 1 to 3 above
4. Teacher handout; reading list of fiction and non-fiction narratives related to the development of water systems around the world
5. General reference books for research activities (Use library, if possible)
6. Teacher-selected materials for lessons on contrast words, transforms that describe, and words that promote coherence.

Notes:

Tie-ins with Specific Career-Related Skills

Increased self-assurance, speaking skill, especially in making narration coherent, reading prowess, knowledge of jobs related to water transportation, consciousness of grammar in communication, ability to compose multiple items into a single message, increased ability to look and listen for gathering data.

Career Development Curriculum Guide: Grade 8
Transportation
Water Transportation

MATHEMATICS

Purpose: To show the role of mathematics in assisting man in his travels on water.

Objectives: Upon completion of work in this unit, the student should be able to:

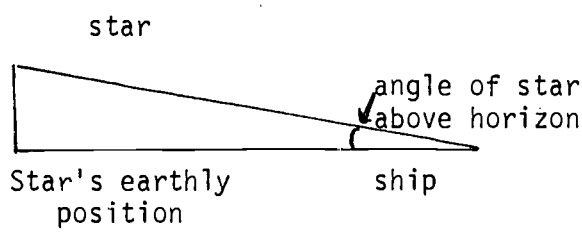
1. Determine the square root using tables and approximations.
2. Identify the Pythagorean relationship in right triangles.
3. Apply the Pythagorean relationship in problem solving.
4. Identify the sine, cosine, and tangent relation in right triangles.
5. Apply the sine, cosine, and tangent relation in appropriate situations to solve problems.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Listen to the social studies teacher explain the use of ferries over the years and their present-day use. The largest car ferries carry about 800 passengers and 360 cars. The mathematics teacher may vary the number of passengers and cars using 800 and 360 as upper limits. The teacher is also to obtain information on the cost of travelling on a car ferry in Delaware and the number of trips that a ferry can make in a day. The students are to calculate the total amount the car ferry in Delaware can earn in a week.
2. Given information on the ferries that cross the Adriatic and Baltic seas and the English Channel by the Social Studies teacher relative to cost and number of trips per day, calculate the amount of money these ferries can earn in a week.
3. Given information about the dimensions of sailing vessels and the number of tons of cargo each one can carry, show that the given vessel can hold the indicated amount of tonnage. Also, calculate the speed of the vessel in miles per hour.

Activities -- Continued

4. The teacher is to designate several distances from the ship to a star and the angle of the star above the horizon using the following diagram:



The teacher is to calculate the distance from the ship to the star's earthly position. The students are to use the Pythagorean theorem to calculate the unknown side when two sides are given.

5. Given three intersecting lines on a nautical map, determine the latitude and longitude at the point of intersection.

Materials:

1. "Navigation." The World Book Encyclopedia, 1972, 14, p. 60-85.

Notes:

. Tie-Ins with Other Subject Areas

Social Studies - information on ferries
Science - navigation theory and geodetic positions of ships; scientific instruments used by seamen.

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SCIENCE

Purpose: To inform pupils of the science involved in boating from the canoe and sailboat to the nuclear-powered ocean liner.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Design and make a model of one type of sail boat.
2. Demonstrate the principle of a block and tackle used to hoist a sail.
3. Recognize the silhouettes of some small pleasure sailboats.
4. Diagram a rowboat, skiff, kayak, and canoe and distinguish between them.
5. Recognize the difference between inboard and outboard motors, and the advantages of each.
6. Draw pleasure cabin cruisers (yachts) and give the range and equipment necessary for a long trip: for a week; for a month.
7. Describe the type of engines used on a ferry boat, an ocean liner, an ocean tugboat, and a freighter.
8. Diagram the components of a nuclear-powered ocean liner.
9. Explain and demonstrate the principle of buoyancy.
10. Explain the principle of the sextant for finding longitude and of the chronometer for finding latitude.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Show transparencies of sailing ships of all descriptions on the overhead projector. Number each one and have pupils mark on their papers one or two distinctive features of sail or hull or both.

Activities -- Continued

Discuss these features as a means of classifying the sailboats. Have pupils report on sailing vessels both historically and technically. How large were the Nina, Pinta, and Santa Maria: How large were the slave ships? How large was the Mayflower?

2. Show a film about sailing aboard a schooner like the "Yankee" (Johnsons: National Geographic Society) and the Coast Guard Academy training ship: The EAGLE. Discuss the physical and scientific skills the officers and crew must have to keep the ship going.

3. Demonstrate a block and tackle (two sets of multiple pulleys) arrangement used to hoist a heavy weight such as many square feet of canvas sail. What is the mechanical advantage of this block-and-tackle arrangement?

4. Have pupils carve boat hulls out of softwood to model the hull configuration of a skiff, a round bottom rowboat, a canoe, and a kayak. How much drag does each hull shape cause in the water? Use a standard-sized sail from a piece of paper and an electric fan to create a steady wind. Time each model as it is blown a measured length in a large water-filled trough (a long empty flower box; a long wooden canal especially built and caulked for this topic in science.) See the Industrial Arts teacher for cooperation on this construction. Weigh each hull before placing it in the water. Use a stop watch to time its passage down the length of the test basin. Compare the weights and shapes of the hulls with their times of passage down the test basin.

5. Field Trip: Individual Quest: Visit the U.S. Navy's David Taylor Model Testing Basin on MacArthur Boulevard. Report on model hull testing done there.

6. Show silhouettes on the overhead projector of types of sailboats: cat rig, gaff-headed cat rig, sloop, cutter, ketch, yawl, schooner, and clipper

Activities -- Continued

ship. Point out the principal sail features of each.

7. Quest: Report on the advantages and disadvantages of each type of sail rigging.

8. Lead a discussion to bring out the class experience in riding in motor boats. Assign reference work to report on how the gasoline engine has been modified to power various boats. Use boat folders and diagrams from Evenrude and Mercury Outboard Motor Companies, from Chris-Craft and other power boat companies.

9. Quest: Visit the annual boat show and report on the boat that interests you most. What are its features; its cost; its requirements for operation and maintenance?

10. Quest: Visit one of the marinas along the Potomac and interview a boat owner about the performance and specifications of his boat.

11. Ask the parent or older sibling of one of the pupils if he will bring in an outboard motor and demonstrate it to the class. If such a person can be found, the custodian should be contacted to provide a barrel or drum of water for the motor to function properly.

12. Quest: Research and report to class on: How may pollution from motors (oil, waste, and noise) be minimized to protect lake and river waterways and human and aquatic life?

13. Individual Quest: Report on each type of ocean-going power boat: ferry boat, tugboat, freighter, ocean liner, and nuclear-powered ship with special reference to the type of motor used. The steam turbine, diesel, and nuclear-power plant make interesting contrasts and similarities to the gasoline engine already studied. Make large diagrams for display above the chalk board. (An excellent reference for this is Cargo Ships by Zim and Skelly. See Materials list.)

Activities -- Continued

14. Raise the question with the class why do boats and ships stay afloat? Why don't steel ships sink? Tell the story about the problem that the king posed to Archimedes about whether his crown was pure gold or an adulterated alloy; Archimedes pondered the problem while in his bath. He jubilantly shouted Eureka! Eureka! as he ran naked through the city when he came up with a hypothesis for the answer to the king's problem.

15. Help each pupil to recall his observations of the water level as he sinks into a full bathtub, and lying there, the change in water level as he inhales and exhales.

16. Demonstrate the law of buoyancy using various blocks of wood and iron of measured volume and a spill can and catch basin. Review or teach pupils how to find the volume of an object. Weigh objects before they are immersed. Find the weight of the water displaced. Help them discover by using aluminum foil or lead foil that a given weight can be distributed over a large volume when made into the hull of a ship and thus displace more than its own weight of water.

17. Discuss with the class the questions: How did Columbus ever sail a straight westward course to find North America? What kept him from just sailing in big circles until he ran out of food and water? How did he ever manage to hit Spain again on his return voyage? This should lead to a discussion of early instruments for navigation among which is the alidade. Have pupils draw pictures and make simple models of these.

18. Borrow a modern sextant from the high school mathematics chairman. Demonstrate its parts. Have pupils use it to ("shoot the sun") find the elevation of the sun at noon. Be careful to use the sun filters attached. (Latitude).

Activities -- Continued

19. If possible borrow a chronometer or an accurate watch. Compare its time here in D.C. with Greenwich Mean Time. The difference in the two times gives the longitude west of Greenwich.

20. Individual Quest: What other navigational aids are available to the coastal sailor besides the sextant and chronometer? Report to the class.

21. Individual Quest: When was the compass invented? How is it used on an iron or steel ship? Report to class.

Materials:

1. Collections of boat pictures and diagrams, boat models where possible
2. Pulley sheaves to be rigged as block and tackle
3. Soft woods for carving
4. Basswood, mahogany, balsa
5. Electric fan
6. Water-tight trough
7. Spill cans for buoyancy
8. Sextant, chronometer, compass

9. Films (Available from D. C. Public Library)
   a. "Seaward the Great Ships." Harris. 1960. (30 min.) h-a. Shows the complete process of shipbuilding.
   b. "Small Craft Safety" Kerkow. 1955. (14 min.) el-a
   c. "Story of a Transport." U.S. Coast Guard. 1945 (18 min.) h-a. The colorful career of the 24,000-ton transport "Wakefield".
   d. "Whaler Out of New Bedford" Cont. 1961. (24 min.) C. h-a. Describes an 1848 whaling voyage around the world using a 1300-foot painting by Benjamin Russel accompanied by 19th-century music.

   The following films are available from Twining, D. C. Schools:
   e. # 733 "Water Safety" B. (11 min.) P-I. Includes swimming and boating.
   f. #1295 "Watermen of the Chesapeake" C. (28 min.) The Bay and its resources, fishermen, oystermen, crabbing, and pony roundup.

Materials -- Continued

g) #2287 "Oceanography - Science of the Sea" C. (11 min.) I-S.
h) #1340 "Tides of the Ocean - What They Are and How the Sun and Moon Cause Them." C. (17 min.) S.

Available from D.C. Library:

i) "The Cape Islander" 1961. (14 min.) C. el-a. It is construction and fishing in the life of the Nova Scotia community.
j) "Heritage of the Chesapeake" Norwood. 1964. (16 min.) C. el-a. Shows skipjacks and oyster dredging.

10. Books

a) Brindze, Ruth. Boating Is Fun, New York: Dodd, Mead and Company, 1949.
b) Brindze, Ruth. All About Sailing the Seven Seas, New York: Random House, 1962.
c) Bendick, Jeanne. Sea So Big, Ship So Small, New York: Rand-McNally, 1963.
d) Colby, Carroll B. First Boat (How to Pick It and How to Use It for Fun Afloat), New York: Coward-McCann, Incorporated, 1956.
e) Hamilton, Lee David. Let's Go Aboard an Atomic Submarine, New York: G.P. Putnam's Sons, Incorporated, 1965.
f) Klein, David. Beginning with Boats, New York: Thomas Y. Crowell Company, 1962.
g) Malo, John. Canoeing, New York: Follett Publishing Company, 1969.
h) Olney, Ross R. Let's Go Sailing: A Handbook for Young Sailors, Englewood Cliffs, New Jersey: Prentice Hall, Incorporated, 1969.
i) Parsons, Tom. Boys' Book of Outboard Boating, New York: The MacMillan Company, 1961.
j) Pearsall, William. Junior Skipper, New York: W. W. Norton and Company, 1965.
k) Robinson, Bill. Better Sailing for Boys and Girls, New York: Dodd, Mead and Company, 1968.

Materials -- Continued

l) Weiss, Harvey, Sailing Small Boats, New York: Young Scott Books, 1967.
m) Zarchy, Harry. Let's Go Boating, New York: Alfred A. Knopf, 1952.
n) Zim, Herbert S. and Skelly, James R. Cargo Ships, New York: William Morrow and Company, 1970.

Notes:

Tie-Ins with Other Subject Areas

Language Arts - composition on life aboard an early sailing vessel.
Mathematics - mechanical advantage; find volumes/methods of displaying data by charts and graphs.
Social Studies - meaning of latitude and longitude; historical ships that opened up American waterways; effects of water pollution on the community.
Industrial Arts - making models and a test trough for the models.

Career Development Curriculum Guide: Grade 8
Transportation
Water Transportation

SOCIAL STUDIES

Purpose: To inform students that water is a major source of transportation and that there are many job op portunities related to this source of transportation.

Objectives: Upon completion of work in this unit, the student should be able to:

1. State the history, categories, and uses of water transportation.
2. State the many job opportunities made available by this vast industry.
3. Discuss how water transportation serves the U.S. Government and other nations.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. List and describe the many kinds of water transportation.
2. Make a bulletin board display of the various types of water craft.
3. Research and report on the uses of watercraft in the War of 1812, the Civil War, World Wars I and II and the Cold War.
4. Discuss how the different industries utilize water transportation.
5. Discuss the safety procedures on commercial and military craft.
6. Explore the job opportunities related to water transportation.
7. Write to different companies and organizations to secure free information pertaining to water transportation. (See Materials)
8. Individual Quest: Research and report on the history of water transportation.

Materials:

1. Books
   a) Cohen, Paul. The Realm of the Submarine. The Macmillan Co. New York, N.Y.
   b) Dietz, Betty Warner. You Can Work in the Transportation Industry. John Day Company. New York, N.Y. 1969.
   c) Dorset, Phyllis Flanders. Historic Ships Afloat. Macmillan Co., New York, N.Y., 1967.
   d) Firestone, Harvey S. Jr. Man on the Move: The Story of Transportation. G.P. Putnam and Sons. New York, N.Y., 1967.
   e) Throm, Edward. Popular Mechanics' Picture History of American Transportation. Simon and Schuster. New York, N.Y., 1952.

2. Pamphlets
   Write to secure these free pamphlets.

   a) The American Waterways Operators Inc.
      1250 Connecticut Ave. Suite 502
      Washington, D.C. 20036
   b) Calhoun Training School
      9 Light St.
      Baltimore, Md. 21202
   c) National Maritime Union
      17 Battery Place
      New York, N.Y. 10004
   d) U.S. Maritime Administration
      441 G Street
      Washington, D.C. 20001
   e) Harry Lundeberg School for Seamanship
      675 4th Avenue
      Brooklyn, N.Y. 11232

BUSINESS EDUCATION

Purpose: To give students an opportunity to become aware of how and where various classes of water carriers operate.

To show how water transportation has impact on orders from foreign countries and the procedures followed in filling such export orders.

Objectives: Upon completion of work in this unit, the student should be able to:

1. From a list of shipments indicate with a check mark those shipments that would probably be transported by water carrier.

2. Type in manuscript form a short, informal report identifying the various classes of water carriers and/or where they operate.

3. Type accurately one document required for an export shipment.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Brainstorm at the typewriter using an appropriate thought starter (see materials section) the advantages and disadvantages of shipping by water carriers.

2. Participate in a teacher-directed discussion on the classification of water carriers and where they operate.

3. Individual/group quest. Collect or draw pictures of different types of vessels, for example, self-propelled vessels, sailing vessels, etc. Use pictures for bulletin board display.

4. Individual/group quest. A committee of students might make a special study of the development of canals and report to the class.

5. Type a directory of the documents required for most export shipments made by ocean freight. This directory would include a brief definition

Activities -- Continued

of each document so that students may refer to it in the following activities:

a. Answer orally or at the typewriter such questions as the following: (a) What form is used as a basis for import duties? (b) What form describes merchandise the same way it is described on the bill of lading?

b. Collect copies of the papers required for export shipment.

6. Type the necessary data in the proper blanks of various papers, such as the shipper's export declaration, commercial invoice, ocean bill of lading, etc.

7. Resource person: Invite a speaker from the Department of Commerce to visit the class to discuss how the government helps exporters by offering various services such as the agency index.

Materials:

1. Books
   a) Crabbe, Ernest H., Enterline, Herman G. and DeBrum. General Business, New Rochelle, New York: South-Western Publishing company, 8th ed., 1962 (unit 9).
   b) Tyler, Elias S., Corenthal, Eugene. Materials Handling: Traffic and Transportation, New York: Gregg Division McGraw-Hill, 1970. (Parts 25 and 26).

2. Film
   a) "Transportation by Water" MP-So-16mm. (14 min.) Alden Films, 5113 16th Avenue, Brooklyn, New York 11204. Rental $3.

3. Filmstrip
   a) "The St. Lawrence Seaway" FS-Si-35mm. A series of three color filmstrips. 30 frames average length. Jim Handly Organization, 2821 East Grand Boulevard, Detroit, Michigan, 48211.

Materials -- Continued

4. Teacher-made "Thought Starter", which can be defined as an idea expressed in written or visual form duplicated and distributed to typists to start his thoughts flowing ("TS" sponsored by Business Education Departments of Detroit Public Schools and Wayne State University).

Notes:

Tie-Ins with Specific Career-Related Skills

Skill in interpreting data contained in documents for shipping as well as accurately preparing such documents is important in occupations such as: clerical department of American export firms, steamship company personnel, customs collector, consular authorities.

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HOME ECONOMICS

Purpose: To give the students an awareness of the career opportunities in home economics that are available in water transportation.

Objectives: Upon completion of work in this unit, the student should be able to:

1. State some of the effects of water transportation on daily family living.

2. State some of the career opportunities that exist in water transportation.

3. Explain how it is possible for people of moderate as well as high economic status to enjoy island cruises and ocean voyages.

4. State how shipping by water transportation enables us to enjoy food products, clothing, and other goods and services from foreign lands.

Activities: To accomplish the objectives, the student may engage in activities such as;

1. Field trip: Visit a D.C. Navy Yard and check to see what type of materials are used for soft seats, dining arrangements, and preparation for foods, etc.

2. Role play a tour escort on a ship.

3. Set up a simulated gift shop for a cruise ship. Make articles which travelers may want.
   a. bands for the hair
   b. small bags for purchased gifts
   c. bracelets and rings from telephone wire (colored)
   d. shoe bags
   e. tote bags for swimwear
   f. embroidered souvenir handkerchiefs and scarves with nautical designs and jargon.

4. Use the booklet, Big Load Afloat, to make a scrapbook of some of the positions involved in water transportation.

Activities -- Continued

5. Prepare a bulletin board of pictures collected from papers and magazines on sea going vessels.

6. Plan and prepare a suitable dinner meal to accompany the following activities:
   a. guests invited to the Captain's table
   b. the proper attire
   c. recreational and social activities after the meal.

Materials:

1. Kit of Merchant Fleet Pictures. Twenty 8 1/2" x 11", which show the different types of ships in the U.S. Merchant Marines and its various aspects, i.e. shipbuilding, launching, seaman, cargo loading, etc. (five copies free). Use official stationery. Maritime Administration, Office of Public Affairs, Washington, D.C. 20235. Pages: 38,170, 207, 236.

2. Big Load Afloat. The American Waterways Operators, Incorporated, Suite 502, 1250 Connecticut Avenue, N.W., Washington, D.C. 20036. (One copy per teacher). Illustrates the U.S. Inland Water Transportation resources provided by vessels operating on rivers, canals, bays, sounds or lakes.

3. Film:
"Big River" (Revised 1963) 16mm. Sound (15 min.) Mississippi River Commission, Corps of Engineers, P.O. Box 80, Vicksburg, Mississippi 39180. Three weeks advance notice, borrower pays return postage. This film, in full color, will show the use of the Mississippi and its importance to the Great Lakes, the Gulf of Mexico and from the western plains to the steel center of Pittsburgh.

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Water Transportation

INDUSTRIAL ARTS

Purpose: To make students aware of the importance of water transportation and to show the career-related opportunities available.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Identify the kinds of materials, goods, and services that are provided to peoples of the world through water transportation.
2. Prepare a report (written) on the kinds of goods that arrive at the Baltimore Port for local use.
3. Explain the role of collective bargaining for workers (ship and shore).
4. Make scrapbook on the history of ship construction.
5. Identify some of the many careers related to water transportation.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Write a paper on the kinds of good and services provided through international water transportation.
2. Field Trip: Visit the Port at Baltimore; observe and interview workers to determine the kinds of goods that arrive there from other parts of the country and the world.
3. Write reports on the collective bargaining contracts for the longshoremen and the ship's crew. Include activities relative to a coast-to-coast strike, and its effect on employment.
4. Write job descriptions for: the longshoreman,

Activities -- Continued

warehouseman, lift operator, boom operator, ship steward, ship captain, deck hand, signalman, radar man, and medical corpsman.

5. Field Trips: Take field trips to Navy Yard, Smithsonian Institute, and other museums to collect information on history and background on ships and water transportation.

6. Lay out design and construct models of ships and map routes used (Chesapeake Bay) to enter Baltimore Harbor. Tie-in with Social Studies, Mathematics.

GRADE 8

CAREER CLUSTER MODULE

IV

TRANSPORTATION

Unit/Topic 5 - Subterranean Transportation (The Metro)

Topic: Subterranean Transportation (The Metro System)

Purpose: To explore the new occupational opportunities created by the Metro System.

To discover the reasons why Metro is needed.

To demonstrate the necessity and effectiveness of interurban cooperation.

To broaden the students' concept of cooperation between federal and local governments in finding projects for the common good.

To show how Metro will eventually bring money, business and job opportunities into now blighted areas even though it has caused the displacement of homes and businesses.

To discover the proposed routes of the Metro System.

Main Ideas:

1. The Metro System has and will create many jobs in the Washington Metropolitan Area.
2. Metro will alleviate some of the problems of the crowded Washington area: (a) rush-hour traffic jams (b) pollution.
3. The building and operation of the Metro System require the cooperation of Washington, D.C., Maryland, and Virginia.
4. Metro requires federal and local funding.
5. Metro affects the community in both positive and negative ways.
   A. Positive
      1. greater ease of travel into, across, and out of the Nation's Capital and the region.
      2. reduction in traffic congestion.
      3. access to suburban jobs for residents of the inner city and greater work force selection for suburban employers.
      4. attraction of new business and industry with expanded job opportunities.
      5. creation of thousands of jobs by Metro construction and operation.
      6. improved efficiency of the extensive federal operations in the region.
      7. broadening of tax bases for the District.
      8. enhancement of real estate values throughout the region.
      9. region-wide transportation for the young,

Main Ideas:

aged, poor, and those dependent upon public transit.

10. better access to educational, cultural, and recreational sites.
11. alleviation of urban blight (proposed shopping center at Minnesota Avenue, N.E.)

B. Negative
1. displacement of homeowners, especially those living on fixed or retirement incomes for which suitable housing is not available.
2. displacement of small businesses which will find it difficult to relocate because of financial reasons.
3. projects a possible financial loss to cab drivers whose service requirements may diminish because of cheaper and more rapid transportation.

6. The proposed Metro route will have arteries which lead to remote areas not now served by public transportation.

Individual and Small Group Quests:

1. Research and report orally on the demands made by black firms for Metro construction contracts.
2. Role Play:
   a. a cab driver who foresees the effects that Metro will have on his business.
   b. a retired couple whose home has been demolished for Metro construction.
3. Make a map showing proposed Metro stations and describe the possible effects on selected areas.
4. Write the New York Transit Authority for information about the N. Y. Subway System and compare it with Metro. This may include:
   a. mileage - current b. cost of operation
   c. comfort - convenience, proposed fare, effect on volume of automobile traffic.
5. Write a report on the work of the Zoning Commission relative to Metro Planning.

Career Opportunities:

1. Unskilled

construction laborer
track worker

2. Semiskilled

craneman
hammerman
station agent
transportation ticket agent
watchman

3. Skilled

carman
computer programmer
electrician
electronics technician
machinist
stationmaster

4. Professional

city manager
civil engineer
electrical engineer
landscape architect
surveyor
systems analyst
traffic engineer
urbanologist

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Transportation
Subterranean Transportation (The Metro System)

LANGUAGE ARTS

Purpose:

To explore jobs related to the transportation of people and goods by underground means.

To realize the value of having connections from an urban center to its outlying suburbs.

To learn that many transportation systems are needed to move men and goods from place to place efficiently (Summarize this cluster to topics on transportation).

To enjoy the sharing of information and experiences on the Metro study as well as previous units on transportation.

To improve class reading skills by careful attention to the entire D. C. Curriculum Booklet, "Our Metro."

To demonstrate skills extended in this cluster.

Objectives:

Upon completion of work in this unit, the student should be able to:

1. List 10-25 jobs created by a new Metro system.
2. Describe the nature of various jobs related to subterranean transportation.
3. Defend both orally and in writing, the high cost of subterranean construction by pointing out the values in having an urban center connected with its suburbs. Tie-in with Social Studies.
4. Explain in coherent, written English why many modes of transportation need to operate simultaneously in modern society.
5. Show by diagram or explain verbally how the Metro locks in with air, water, and surface transportation.

Activities:

To accomplish these objectives, the students may:

1. Read some of the lessons in the D. C. Curriculum

Activities -- Continued

Booklet on a major city metro system.

2. Make a minibook, "The Modern Metro": gather facts, insights, illustrations on subterranean transportation, write into organized sections.

3. Finish cassettes with recordings of field experiences listed as common activities for this unit.

4. Plan and execute a culmination program in the auditorium for this cluster: share student work beginning with first topic, surface transportation and including projects from this last unit, subterranean transportation.

5. Prepare individual presentations for the auditorium culmination, "Modern Transportation."

6. Participate in class debates on the topic, "Resolved: The dangers and cost of metro construction make it an undesirable mode of transportation."

7. See a series of sound-filmstrips to establish overall understanding of how all transportation systems form a vast network servicing mankind: Transportation Today, Coronet, 6 filmstrips averaging 50 frames.

   a. Transport Methods We Use
   b. Water Systems
   c. Rail Systems
   d. Highway Systems
   e. Air Systems
   f. Systems Work Together

8. Evaluate presentations of classmates by applying principles of transformational grammar studied in this cluster to the oral English of others.

9. Present "My Metro Minibook on Modern Transportation" to a committee of student judges for evaluation: teacher can supply prizes; select best for auditorium sharing.

Materials:

1. D. C. Curriculum Booklet, one per student
2. Spiral bound blank pages for children's Metro Minibook (one set per student)
3. Cassettes from previous unit
4. Multiple tape recorders for use in preparing the auditorium program
5. Materials obtained from investigating other Metro systems (sse common resources list for this unit): children can cut, paste, organize these materials into individual minibooks.
6. Filmstrip series - "Transportation Today" from Coronet (See #8 above).
7. Art supplies and small tools for individual projects being prepared for auditorium program.
8. Teacher handout on "Using Transformational Grammar to Evaluate Oral English": students need to evaluate debates as well as reports from unit field trips.
9. Paper and envelopes for students to write invitation to guests for final auditorium program.

Notes:

Tie-Ins with Specific Career-Related Skills

Self-assurance in speaking to groups, knowledge of jobs related to subterranean transportation, improved reading, increased attention span, awareness of grammatical quality, improved perceptual-motor skills, increased social consciousness, more mature (sustained) interpersonal relationships, greater awareness of "people problems" implicit in industry and commerce, intellectual poise from understanding that man can solve his problems in many different ways.

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MATHEMATICS

Purpose: To show the student the value and the necessity of mathematics in the building,maintenance, and operation of the Metro.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Present statistical data in a frequency table and graphically.

2. Determine the mean, median, and mode of a given set of date. Define central tendency.

3. Find the missing element in all three types of percentage problems.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Listen to a teacher-directed discussion. The teacher is to refer to the Typical Train Times Between Stations sheet to choose areas knowledgeable to the students. The students are to find the mean, median, and mode of the times that it takes to travel from a chosen place to the seven key points listed. For example, the students would find the mean, median, and mode for the times to travel from Deane Avenue, N.E. to Metro Center, Gallery Place, L'Enfant Plaza, etc. The students are to graph the data for the seven key points.

2. Write to the New York Transit Authority for information about the New York Subway System. The students are to compare the current mileage, number of stations, equipment, speed, parking spaces, fare, ridership by 1990, and the effect on volume of automobile traffic. Tie-in with Social Studies.

3. After the teacher selects several pairs of points in Washington, D.C., find the cost and amount of time that it takes to travel from one place to the other by bus, taxi, and the Metro.

Activities -- Continued

4. Given any two areas such as Northwest and Southeast, select several well placed points in each area. The students are to use these points to calculate the average time that it takes to travel from Northwest to Southeast.

5. Calculate the percent of construction money for Metro that will be spent in salaries for 1972 using the Metro News Release dated Sunday, December 26, 1971:

   a. "In 1972 Metro will: pay about $120 million for construction including $40 to $50 million in payrolls."

6. Calculate the total mileage to be completed in in Washington, D.C. by July 4, 1974:

   The total authorized mileage for Washington, D.C. is 37.7. By July 4, 1974, 4.6 miles will have been completed.

7. Calculate the percent of money spent for the major categories listed on the Metro Construction Nationwide Benefits such as cement, reinforcing steel, lumber, etc.

   "Because the Washington region is not an industrial and manufacturing area, much of the mechanical, electrical, construction, and physical materials will be produced in other cities and states across the nation. An examination of the major categories will indicate quantities and dollars involved, and the great range of benefitting industries:

		(millions)
Cement	1.5 mil. cub. yds.	$ 25.5
Reinforcing Steel	175,000 tons	50.3
Structural Steel	120,000 tons	59.6
Lumber	150,000,000 bd. ft.	36.4
Running Rail	480 miles	5.3
Contact Rail	240 miles	2.8
Electrical Equipment		115.2
Mechanical Equipment		140.0
Vehicles	556 cars	199.0
Train Control, Electronics and Communications		100.0
	Total	$ 734.1

Activities -- Continued

8. Use the scale on the Metro Map (3/4 inches = 1/2 mile) to measure distances of the Metro line on the map.

Materials:

1. Metro News Release dated December 26, 1971
2. Metro Construction - Nationwide Benefits
3. Metro Minutes, Station to Station

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SCIENCE

Purpose: To help pupils understand how the electric motor - the muscle of the subway machines - works. Since Metro embodies the latest designs in technology, these innovations are far ahead of the textbook writers; thus, it is necessary to resort to the basic principles underlying technology.

Objectives: Upon completion of work in this unit, the student should be able to:

1. State and demonstrate the interrelationship between magnetism and electricity.
2. Wind an armature.
3. Make a commutator and brushes.
4. Wind field magnets.
5. Put the above components together to make a working motor.
6. Transfer the basic principles to the operation of Metro trains and station equipment.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Discuss with the teachers the manner by which electric trains are propelled: the motive power, the source of electricity, and the braking system. List these topics on the chalk board or on the overhead projector.
2. Demonstrate the component parts of an old electric motor from a washer, dryer, or furnace fan showing how they fit together as rotor, stator, brushes, etc. Leave this on display on the General Interest Table for pupils' inspection at their leisure. Tie label tags on the parts to identify them.
3. Pose the question: What makes an electric motor work? Help the pupils with leading questions to bring out:

electricity	magnetism
electric current	magnetic effects

Activities -- Continued

voltage	power
switches	wires
rheostats	fuses
transformer	

Say: "Let's learn about these parts by building an electric motor."

4. Begin by posing the question: "How are magnetism and electricity interrelated?" have pupils gather these materials: (teams of two preferred) 1 1/2 v. battery, magnet wire (approximately #20), compass (magnetic), 1 1/2 v. light bulb, knife switch, and a permanent magnet.

   Design investigations to help them discover these principles (any textbook has good procedures):

   a. Every wire conducting an electric current is surrounded by a magnetic field.
   b. The direction of the magnetic field depends on the direction of the current flow.
   c. Whenever a magnetic field moves past a conducting wire, an electric current is induced in the wire.
   d. To induce an electric current in a conductor, either the magnetic field or the conductor may be moved past the other one.
   e. The direction of the current flow induced depends on the direction of the moving magnetic field.

   Summarize these five principles with the class helping them to express and word their observations. Make cue cards for each principle and post each above the chalk board. Pupils should memorize these (suggested).

5. Identify the parts of the demonstration of St. Louis motors. Try to provide one motor per four pupils. Identify each part of the motor. Replace the permanent magnets of the motor with the field electromagnet. How does the field electromagnet perform the same function as the bar magnets?

6. Let each team take a large nail or bolt and wind it with thin magnet wire to make an electromagnet, being sure to leave twelve-inch leads at both ends. Suspend this electromagnet by its leads after attaching

Activities -- Continued

it to the battery.

a. Chase this electromagnet with N and S poles of permanent magnets making it twist up the suspending wires. Help pupils see the need for a device like slip rings or a commutator and brushes to prevent the wires twisting on a rotor.
b. Pose the question: "Why did you have to chase the electromagnet with the permanent magnets to make it rotate?" Put the correct concept on the board: that of attraction and repulsion.

7. Ask: "How can you make this attraction and repulsion effect in the St. Louis motor?" Let pupils very carefully trace the direction of current flow from the battery through the brush to the commutator and the electromagnet rotor. Put aside the stator (field magnet) from the St. Louis motor. Hold the rotor in a selected position and test each end of it with a compass to determine its N-pole location. Now turn the rotor 1/2 turn (180°) and notice what happens to that same end of the rotor; how has it changed from an N to an S-pole? What made the direction of the current change? Help pupils realize that the current now flows through the other half of the commutator changing the former S-pole to an N-pole. Let pupils experiment several times with this. It is a key to understanding.

8. Replace the field magnets and run the St. Louis motor. Use at least 3 volts. Have pupils copy textbook diagrams to help each one grasp the basic principle of how the commutator makes the rotor keep changing polarity.

9. Bring out plans and tools for fashioning and winding small electric motors. Many different plans for this are available in experimenter's books and from General Electric, Westinghouse, and other motor manufacturers. Three of the references listed have plans for motors: John Michel, Raymond Yates, and Alfred Morgan. Try to get cooperation of the Industrial Arts and Home Economics teachers on this for shared time. It is very instructive and gratifying to build an electric motor.

10. Resource Person: Contact the Community-Services Office of "Metro" (Washington Metropolitan Area Transit

Activities -- Continued

authority, at 484-2633 for a guest speaker on propelling the subway cars. Metro people are quite cooperative and anxious to bring Metro to the public.

Materials:

1. Magnet wire (approx. #20)
2. 8 - St. Louis electric motors
3. Assorted pliers and cutters
4. Soldering irons (electric)
5. Fahnstock clips

6. Films (Twining School, D.C. Films)

   a. #2249 "Electromagnetism and Electric Motors," C, (15 min.)
   b. # 156 "156 Electromagnets," B, (11 min.) I.
   c. #1016 "Electricity All About Us," B, (11 min.) I.
   d. #1493 "Electricity and How It Is Made," B. (16 min.) P-I.

7. Books

   a. Bendick, Jeanne. Electronics for Young People, New York: McGraw-Hill Book Company, Incorporated, 1960.
   b. Billings, Henry. Diesel-Electric 4030, New York: Viking Press, 1950.
   c. Block, Marie H. Tunnels, New York: Coward-McCann, Incorporated, 1954.
   d. Colby, C.B. Railroads U.S.A., New York: Coward-McCann, 1970. (Gives information on the metroliner).
   e. Irving, Robert. Electronics, New York: Alfred A. Knopf, 1962.
   f. Michel, John. Small Motors You Can Make, New York: D. Van Nostrand Company, Incorporated, 1963.
   g. Morgan, Alfred. Things a Boy Can Do with Electricity, New York: Charles Scribner's Sons, 1938. An oldie but goody!
   h. Neal, Charles D. Safe and Simple Projects with Electricity, Chicago: Children's Press, 1965.
   i. Yates, Raymond F. A Boy and a Motor, New York: Harper and Row Publishers, 1944. (Shows many electric motors easily assembled out of things

Materials -- Continued

found around the house).

j. Yates, Raymond F. The Boys' Book of Model Railroading, New York: Harper and Row, Publishers, 1951.

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SOCIAL STUDIES

Purpose: To assist the students in understanding how subterranean transportation has become necessary because of the crowded conditions in the inner city and the flight of so many businesses to the suburbs.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Identify some of the problems of mass transportation that made Metro necessary.
2. Discuss the advantages of Metro over other forms of mass transportation.
3. Discuss how the area governments cooperated to make Metro a reality.
4. Discuss some of the problems faced by the planners of the Metro system.
5. Study interesting features of systems in other cities in the U.S. and in other parts of the world.
6. Learn the job opportunities made available by the construction of subterranean transportation.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Discuss why the American transportation system is so far behind in comparison with other developments.
2. Trace the origin and development of the present Metro System.
3. Discuss the advantages of having the Metro System and some of the problems that it will eliminate.
4. Field Trip: Visit the Metro Demonstration Center and discuss Washington before the subway and the Washington that will exist after the subway.
5. Field Trip: Observe a construction site and report on the variety of jobs performed.
6. Construct a bulletin board display of Metro job

Activities -- Continued

opportunities.

7. Listen to a teacher-led discussion on high speed transit in foreign countries such as Japan and France.

8. Discuss the concept of megalopolis as it is related to subterranean transportation.

9. Write the D.C. Government for information concerning the Metro System.

10. Discuss some of the problems encountered during the construction of the Metro System.

11. Discuss the displacement of people and businesses because of the construction of the Metro System.

12. View the film, "Go" and discuss their views on the fairness of the way in which Metro was started.

Materials:

1. Books

   a. Casner, Mabel and Gabriel, Ralph H. Story of the American Nation. Harcourt Brace and World Inc. New York, N.Y. 1967.
   b. Pell, Claiborne. Megalopolis Unbound. Frederick A. Praeger Publishers. New York, N.Y. 1966.
   c. Reische, Diana. Problems of Mass Transportation. H.W. Wilson Co. New York, N.Y. 1970.
   d. Throm, Edward L. Picture History of American Transportation. Simon and Schuster Co. New York, N.Y. 1952.

2. Magazines

   a. Business Week. October 21, 1967. "More Zip for the Fastest Train: Japan's New Takaido Line."
   b. Fortune. April, 1967. "Subways don't have to be Miserable."
   c. Urban World. Vol. 4. January 7, 1972. "Bay Area Transit Train."

Materials -- Continued

3. Newspapers

   a. Lindsey, Robert. "Easy Ride on a Philadelphia Transit." New York Times, February 16, 1970.

4. Film

   a. "Go." Call WMATA's office of community services. 484-2640.

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BUSINESS EDUCATION

Purpose: To give students an opportunity to compare their own individual growth in learning regarding a current on-going project in transportation - The Metro System.

To give students an opportunity to compare certain aspects of the Metro System with the New York Subway System.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Analyze in writing the learning change that has taken place regarding the metro System by comparing the results of a pre-test and a post-test instrument on the topic.

2. Compare in a typewritten report form one aspect of the Metro System with that of the New York Subway System.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Take a series of pre-tests pertaining to the Metro System. Such tests will attempt to give students a written record of what they currently know about the Metro System. This activity could be extensive in nature and might include such questions as the following:

   a. What occupational opportunities do you think might be created by the Metro System?
   b. Why do you think there might be a need for the Metro? State reasons.
   c. State positive ways that the Metro might affect the community. What negative aspects might Metro have on the community?

2. Participate in a teacher-directed discussion on effective notetaking techniques. Students could become familiar with the Steno notebook and use such a notebook in collecting data about the Metro System in other classes.

3. Resource Person: Have a guest speaker from Metro talk to the class about employment outlook and necessary qualifications for positions provided by the

Activities -- Continued

Metro. Students should use proper note-taking techniques during this activity.

4. Small Group Quest: Compose and type a letter to the New York Transit Authority for information about the New York Subway System.

5. Individual/group quest: Select one aspect such as "proposed fare" and compare this factor between the Metro System and the New York Subway System.

6. Individual/group quest: Give oral reports to the class on data collected in activity No. 5. Utilize note-taking techniques to record the important points in the report.

7. Participate in a teacher-directed discussion on the process of skills of comparing characteristics of two similar, but also different, transportation systems; e.g. - The Metro System and the New York Subway System.

8. Relate in rough draft form at the typewriter their knowledge of the Metro System following the completion of Activities 2 through 7. Students should feel free to use their notes as recorded in their individual steno pads.

9. Using both their rough drafts or post-test data and pre-test data, compare and analyze the change that they individually feel has taken place in their learnings about the Metro System.

Materials:

1. Books

   a. Leslie, Louis, Zoubek, Charles and Deese, James. Gregg Notehand, New York: Gregg Division, McGraw-Hill Book Company, (Units 15, 22 and 36), 1960.

2. Metro Information Kits
3. Map of proposed Metro Route available from Metro Headquarters (call Mr. Gerald Gough, 484-2727).

Notes:

Tie-Ins with Specific Career-Related Skills

Skill in note-taking, summarizing and comparing data is important in occupations such as: secretary, legal department of The Metro System.

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HOME ECONOMICS

Purpose:

To have the students learn the importance of the Metro System which will offer job opportunities in the area of home economics.

To broaden the students' knowledge of the cooperation between federal and local businesses to achieve a common goal for the welfare of all.

Objectives:

Upon completion of work in this unit, the student should be able to:

1. List some of the jobs that will be created as a result of the Metro in the Washington Metropolitan Area, and state the qualifications required by one job in which he/she is interested.

2. Explain how various sections of the community will be affected and which will involve persons trained in special areas of home economics.

3. Identify the adjustments that some diplaced families and businesses must make.

4. Explain the effect that the Metro System will have upon family living and the role that home economists can play in this respect.

Activities:

To accomplish the objectives, the student may engage in activities such as:

1. Write to the Embassies of London, Japan, and France for information on their subway systems. Check on safety measures, seating arrangements, design, etc.

2. Write to the New York Transit Authority for information about the New York Subway System relative to the comfort and convenience of the commuters.

3. Interview a family which is to be displaced by the Metro.

Activities -- Continued

4. View and discuss the film, "A City Is a People."

5. Order Metro information kits from Metro Headquarters. Check these and list areas where a knowledge of home economics plays a leading role - decorations, services, arrangements, etc.

Materials:

1. Metro information kits
2. Films
   "A City Is People" (1970) 16mm Sound (22 min.)
   Book two months in advance, Downtown Progress, 521 Twelfth Street, Northwest, Washington, D. C. 20004. This film in full color, highlights the potential for future improvements in the living and working environment of Washington, D. C. against a background review of current problems and development activities.

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INDUSTRIAL ARTS

Purpose: To enable the students to observe firsthand the construction of the Metro System and to see the job opportunities made available during and after construction.

Objectives: Upon completion of work in this unit, the student should be able to:

1. Explain why the Metro is needed.
2. Identify the new occupational opportunities created by the Metro System.
3. Explain how the Metro will merge suburbia with the city of Washington, D. C.
4. Construct a miniature lay-out of the Metro System.

Activities: To accomplish the objectives, the student may engage in activities such as:

1. Individual Quest: Visit Metro headquarters to obtain background information on the Metro System.
2. Individual Quests: Have students investigate the projected businesses planned at each Metro stop and give oral and/or written reports. Tie-in with Business Education.
3. Make a collage or scrapbook showing how Metro will link all of suburbia with the central city. Show how the rapid transit system and new construction will cause the city and suburbia to actually merge. Tie-in with Social Studies.
4. Individual Quest: Research and report on the role of Black workers and businessmen in the construction of the Metro System. Deal with industrial contracts to labor. Tie-in with Business Education.
5. Build a working model of the Metro System (if feasible); or lay out maps with a miniature

Activities -- Continued

cutout for the various stages of the system (excavation, drilling, boring, shoring, etc.)

6. Individual Quest: Visit construction sites of section that is almost completed. Prepare an oral or written report and present it to the class.

Materials:

1. Modeling clay
2. Miniature subway cars
3. Cardboard