

Problem Solving

Have you ever said, “I can give my students a set of problems that all follow a certain model, and they’ll do fine. The minute a problem is introduced that doesn’t look like something they’ve seen before, they’re lost.”

Why is this a common occurrence? Students have not learned the process of problem solving. The definition of problem solving is “the process of obtaining a satisfactory solution to a novel problem, or at least a problem that the problem solver has not seen before.”

If we have a responsibility to instruct in this area as well as in content, the simple question is, how? A problem-solving process directs problem solvers to:

1. Read about the situation.
2. Define the given situation or problem (which consists of reasoning, classifying, identifying series and/or relationships, creating analogies, and checking for consistency).
3. Define the “real” problem and create a “representation” of it.
4. Plan.
5. Do it.
6. Check, look back, and implement.

The process of problem solving has to be taught if we want to raise the level of students’ problem-solving abilities. The following skills need to be described, modeled, and practiced:

Identify, locate, obtain, and evaluate missing information.

Learn on one’s own, using thinking skills as **analysis**.

Generalize, simplify, and broaden perspectives; remain motivated and persevere.

Cope with fear, anxiety, and procrastination.

Know how one thinks.

Recognize interpersonal and group skills.

Apply communication skills.

To teach problem solving, teachers should:

- Model problem solving (making an occasional error or going down a blind alley is good!) so that students see the process is not straightforward or linear.
- Demonstrate there is more than one way to solve a problem so that students don’t look for the one right way.
- Redescribe the problem in qualitative terms and apply relevant underlying principles;
- Help students create a plan for the solution, estimating the range in which the answer might lie.
- Show how to break the problem down into manageable parts, identifying and clarifying key concepts, drawing a diagram, translating the problem into a simpler form.
- Help identify and isolate factors that might lead to wrong solutions and develop strategies to counteract these problems.

Woods, D.R. “How might I teach problem-solving abilities?” Developing critical thinking and problem-solving abilities, No. 30 Jossey-Bass, 1987.

Career Activity File — Employability Skills

Problem Solving (continued)

Another method to help students with problem solving is the *Thinking Aloud Pair Problem Solving* (TAPPS) process that was introduced by Lochhead and Whimbey (1987). In this instructional method, two students work together to solve a series of short problems. The idea behind TAPPS is that students increase their analytical reasoning skills when they work through the problem-solving process aloud.

Students are paired and given a series of problems. The two students are given specific roles that switch with each problem: Problem Solver and Listener. The problem solver reads the problem aloud and talks through the solution to the problem. The listener follows all of the problem solver's steps and catches any errors that occur. For the listener to be effective, he or she must also understand the reasoning process behind the steps.

Sources: <http://www.wcer.wisc.edu/nise/CL1/CL/doingcl/tapps.htm>
http://www.wcsi.unian.it/educa/problemsolving/stice_ps.html

The Cognitive Domain: Bloom's Taxonomy – Analysis

Of all the thinking skills in *Bloom's Taxonomy*, analysis is required more in the problem-solving process. Analysis requires more than knowledge, comprehension, and application. It also requires an understanding of the underlying structure of the material. Analysis is the ability to break the subject down into its parts and identify the relationship between the parts.

Analysis Level Objectives

Interpret	Analyze	Differentiate	Compare
Contrast	Scrutinize	Categorize	Probe
Investigate	Discover	Inquire	Detect
Inspect	Classify	Arrange	Group
Organize	Examine	Survey	Dissect
Inventory	Question	Test	Distinguish
Diagram			

In the future, our students will encounter problems they have never faced before. The information will only be useful if they understand it well enough to know when to use it and how to apply it to new situations. Therefore, courses should be teaching higher levels of learning. Students should demonstrate that they are able to analyze a new situation and apply their new knowledge.

Examples of a Problem-Solving Model

Big6 Skills

<http://www.big6.com/kids>

The Big6 information problem-solving model is applicable whenever people need and use information. It integrates information search and uses skills along with technology tools in a systematic process to find, use, apply, and evaluate information to specific needs and tasks. The K-12 site contains helpful hints, templates, worksheets, songs, games, and fun to help students master essential information problem-solving skills.

Career Activity File — Employability Skills

Problem Solving (continued)

Problem-Solving Competitions and Clubs

Whether competitions are integrated within the curriculum or as an after-school program, students will use problem-solving strategies and decision-making skills. Students will practice collaboration, listening, and working with ideas. When writing their ideas, students learn to clearly express exactly what they mean and to merge their research with their ideas. They also learn self-confidence and patience through both individual and team efforts.

ENGLISH

Name Scenario Writing Competition (Future Problem-Solving Program)

Grades 4th – 12th

Internet Site <http://www.fpsp.org/>

Information Students compose futuristic short stories related to one of the current year's topics. They focus at least 20 years into the future and examine what effects solutions developed now would have on future society. Teachers use the evaluation score sheet for evaluating their own students' work.

Name WordMaster

Grades 3rd – 12th

Internet Site <http://www.wordmasterschallenge.com/>

Information WordMasters encourages growth in vocabulary and verbal reasoning. The contest challenges students to complete analogies based on relationships among words they have learned. These analogies are based on special vocabulary lists, which participants are encouraged to study before each meet.

Students in Grades 9-12 focus on perceptive reading, sensitivity to language, and an appreciation of style. Texts for the Challenge can include short fiction, poetry, and essays.

SCIENCE/ENGINEERING

Name ToyChallenge

Grades 5th – 8th

Internet Site <http://www.toychallenge.com/>

Information This national toy design competition encourages girls and boys to have an interest in engineering and inspires them to pursue careers in this area. Design teams must find an adult coach and register; choose a theme from 10 toy categories; and create and submit for evaluation a visual presentation and operating instructions for their original toy or game. Boys and girls may participate, but at least half of the members of each team must be girls.

Note: This is a suggested list of many available competitions. Please research others to meet your needs.

Career Activity File — Employability Skills

Problem Solving (continued)

Name The Rube Goldberg Machine Contest
Grades High School for Competition (Any age for fun.)
Internet Site <http://www.rube-goldberg.com/html/contest.htm>
Information Groups are given an elementary challenge: something as simple as peeling an apple, sharpening a pencil, or putting toothpaste on a toothbrush. But instead of just “solving” the problem, students have to make the solution as complicated as possible with a minimum of 20 steps. An assemblage of ordinary objects and mechanical gadgets are linked together and somehow get to the desired goal.

It is suggested that students start with the end — what they are trying to accomplish — and work backwards, step by step. Students describe each step on a separate piece of paper. This allows them to change and edit their Invention Machine step by step.

GENERAL

Name Odyssey of the Mind
Grade K – 12th
Internet Site <http://www.odysseyofthemind.com/>
Information The team is required to solve a long-term problem that changes every year. Teams choose from five general categories: mechanical/vehicle, technical performance, classics, structure, and performance. Students learn lifelong skills such as working with others as a team, evaluating ideas, making decisions, and creating solutions while also developing self-confidence from their experiences.
Contact Marianne Zamor, President, 918-272-3936 or mzapcalc@aol.com

Name Destination ImagiNation®
Grades K – 12th
Internet Site <http://www.destinationimagination.org/>
<http://www.nhom.org/> (New Hampshire home page)
Information Teams of up to seven students choose from one of six team challenges. Based on the team’s interests, students will spend several months perfecting their solutions. New team challenges are created every year. Teams use art, technology, performance, and real world relevance.

Career Activity File — Employability Skills

Problem Solving (continued)

Name Chess Club
Grades 1st – 5th
Information The club provides an opportunity for children to enhance thinking strategies. Students meet once a week during the mid-day recess and are divided according to their ability into beginners, intermediate, and advanced.
Contact For more information, contact Patricia Johnson, Deer Creek Elementary, <http://www.deercreek.k12.ok.us/es/dce/enrichment.htm>
A summary of 14 research projects show how playing chess helps children in their school work.
<http://www.ssi-school.com/chess%20research/ChessResearchSummary.pdf>

Name Continental League
Grade 2nd – 12th
Internet Site
Overview <http://continentalmathleague.hostrack.com/cmlove.htm>
Math <http://continentalmathleague.hostrack.com/>
Science <http://continentalmathleague.hostrack.com/Natsci.htm>
Social Studies <http://continentalmathleague.hostrack.com/Natsoc.htm>
Language Arts <http://continentalmathleague.hostrack.com/Natlan.htm>
Current Events <http://continentalmathleague.hostrack.com/Natcur.htm>
Information This site provides a variety of core curriculum contests.

Name Future Problem-Solving Program
Grades 4th – 12th
Internet Site <http://www.fpsp.org/> (Refer to page 19 for detailed information.)

TECHNOLOGY

Name TRIO ThinkQuest
Age 12-19
Internet Site <http://depts.washington.edu/trio/comp/index.shtml>
Information The TRIO ThinkQuest Competition is a contest open to participants in an Upward Bound and Talent Search Program. Students are encouraged to work in teams of two or three to build Web sites that could be used as learning tools by other students.

Career Activity File — Employability Skills

Problem Solving (continued)

Name ThinkQuest USA
Grades 3rd – 12th
Internet Site <http://www.thinkquest.org>
Information ThinkQuest Programs provide a highly motivating opportunity for students and educators to work collaboratively in teams to learn as they create Web-based learning materials and teach others. The “Library” currently contains more than 5,000 Web sites to search. The Internet sites were built by kids for kids to use and learn. Winners can receive cash prizes, computers, and networking resources.

ARTS/SCIENCE/TECHNOLOGY

Name Imagine Mars Project
Grades K - 12th
Internet Site <http://imaginemars.jpl.nasa.gov/index3.html>
Information Students explore their own community and decide which arts, scientific, and cultural elements will be important on Mars. Then they develop their ideal community, from an interdisciplinary perspective of arts, sciences, and technology. Lesson plans and resources are available to launch an exciting journey.

Name FIRST LEGO® League
Ages 9 - 14
Internet Site <http://www.usfirst.org/jrobotcs/flego.htm>
Information This competition combines a hands-on, interactive robotics program with a sports-like atmosphere. Teams consist of up to 10 players with the focus on such things as team building, problem solving, creativity, and analytical thinking. Each September, a new Challenge is unveiled. Over the course of eight weeks, students strategize, design, build, program, test, and refine a fully autonomous robot capable of completing the various missions.

MATHEMATICS

Name “Ole Miss” Problems of the Week
Grade Elementary – High School
Internet Site <http://www.olemiss.edu/mathed/contest/index.htm>
Information Problem of the Week includes elementary brainteaser, algebra, geometry, and middle school madness.

Career Activity File — Employability Skills

Problem Solving (continued)

Name Math League

Grade 4th - 12th

Internet Site <http://www.mathleague.com/>

Information The Math League specializes in math contests, books, and computer software designed to stimulate interest and confidence in mathematics for students. Contest problems are designed to cover a range of mathematical knowledge for each grade level. All of the problems on each contest require no additional knowledge of mathematics beyond the grade level they test.

Name Mathematical Olympiads

Grade 4th - 8th

Internet Site <http://www.moems.org/>

Information The highlights for students in this math club are the five monthly contests, scheduled from November to March. These contests provide an incentive for students to intensify their study of math. Contests consist of five nonroutine problems that are worked in the participating school. Students work alone without calculators.

Name Mathcounts

Grade Middle School

Internet Site <http://mathcounts.org/>

Information The MATHCOUNTS Foundation provides a complimentary copy of its *School Handbook* to middle schools across the country. Teachers and volunteers use these materials to coach student “Mathletes,” as part of in-class instruction or as an extracurricular activity. After several months of coaching, participating schools select students to compete individually or as part of a team.

Contact Alicia Taylor-Helsley, OK State MATHCOUNTS Coordinator
Phone: (405) 528-1435, ahelsley@ospe.org

Name USA Mathematics Talent Search

Grades High School

Internet Site <http://www.nsa.gov/programs/mepp/usamts.html>

Information This free mathematics competition is open to all high school students in the United States. Students have a full month to work out their solutions. The problems range in difficulty from being within the reach of most high school students to challenging the best students in the nation. Students may use any materials — books, calculators, and computers, but all the work must be their own.

Career Activity File — Employability Skills

Problem Solving (continued)

Name High School Mathematical Contest in Modeling
Grade High School
Internet Site <http://www.comap.com/highschool/contests/himcm/index.html>
Information This competition takes place with your teams consisting of up to four students working on a real-world problem for a consecutive 36-hour period. Teams are allowed to work on the contest problem at any available facility and then submit their Solution Papers to be judged.

Name Mandelbrot Competition
Grade High School
Internet Site <http://www.mandelbrot.org/>
Information The Mandelbrot Competition is split into two divisions: advanced problem solvers and less experienced students. The format for either division is the same: the competition takes place in four rounds spaced throughout the school year, each consisting of an individual test and a team test. The questions cover a variety of non-calculus topics such as algebra, geometry, trigonometry, and probability, plus a few other topics like number theory or classical inequalities that may be less familiar.

Winner of the Future Problem Solving Program Slogan Contest – Junior Division

“Observing the past, fixing the present, and creating a better future.”
C. Crachiola, Wass Elementary School, Troy, Michigan

Problem Solving (continued)

Future Problem-Solving Program Fact Sheet

What is the Future Problem-Solving Program?

The mission of the Future Problem-Solving Program (FPSP) is to design and promote positive futures using creative problem solving. FPSP can be used as an integral part of the school's curriculum or as an academic extracurricular activity or both. Students use creative and analytical thinking skills to research real world issues that affect our future.

What employability skills do FPSP participants learn? They will:

- Develop creative thinking abilities.
- Learn and employ problem-solving strategies.
- Develop teamwork skills.
- Improve oral and written communication.
- Exercise critical and analytical thought.
- Develop, use, and improve research techniques.

How does the program work?

Students or teams participate in one of three divisions: Junior – Grades 4-6, Middle – Grades 7-9, and Senior – Grades 10-12.

What kind of problem-solving activities does FPSP offer?

Community Problem Solving (CmPS)

Teams explore problems that exist within the school, local community, region, state, or nation. (See Web Sites for Community Projects, next page.)

A team of middle grade students in Texas focused on relieving the boredom and depression of adolescent hospital patients by creating and delivering “Boredom Buster Kits” to four area hospitals as well as three hospitals in Eastern Europe.

Team Problem Solving

Four-member teams research and apply the six-step FPS process to at least three different topics annually.

Scenario Writing

Students create a futuristic short story based on one of the five FPSP topics. The scenarios are limited to 1,500 words, and the setting must be 20 years into the future.

Non-Competitive Program

Designed for the regular classroom, this program introduces students to skills in creative problem solving.

For more information:

Future Problem Solving Program, (800) 256-1499

National Office – <http://www.fpsp.org/>

Texas Chapter – <http://lonestar.texas.net/~lhutto/>

Problem Solving (continued)

Web Sites for Community Projects

This federal Web site provides hundreds of resources for teaching and learning.

<http://www.ed.gov/free>

Sponsored by American Fidelity Education Services, this site contains a plethora of activities, lesson plans, and resources on current events and curriculum content items.

<http://www.education-world.com>

The Education World Web site offers a template for a model service learning project that includes cross-curriculum goals, activities, and strategies for assessment. Based on a project from Desert Sky Middle School in Arizona.

http://www.education-world.com/a_lesson/lesson154.shtml

The Nonprofit Prophets' Web site is sponsored by Pacific Bell to encourage students to investigate a problem area and create a w.w.w. resource page on the problem. Links to topics and resources for investigating problems and conducting topical research.

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

Web site of the Corporation for National Service. Links to Learn and Serve America.

<http://www.cns.gov>

Learn and Serve America is a national program that provides funds to state educational agencies in order to encourage service learning in schools.

<http://www.learnandserve.org>

Problem Solving (continued)

Opportunities in Work Clothes: On-Line Problem-Solving Project Structures

Problem solving is one of the most beneficial educational opportunities that we can offer students of any age. The Internet problem-solving activities can be either competitive or collaborative and can be used to extend cooperative problem-solving activity around the world.

Use the six different educational telecomputing activity structures: *information searches*, *electronic process writing*, *sequential creations*, *parallel problem solving*, *simulations*, and *social action projects* to design effective educational telecomputing experiences for your students.

Information Searches

In this type of on-line activity, students are provided with clues and must use reference sources (either electronic or paper-based) to solve problems.

Elementary example — The project provided sets of clues about fictitious elementary schools in real places in the world, then asked participants to use whatever research tools they had available to deduce the “mystery city.”
Coordinated by Dorothy Whitney, Elsmere Elementary School in Delmar, New York.

Electronic Process Writing

Students post writings that they wrote for newspapers so that other students can offer feedback in an electronic version of process writing sessions.

Sequential Creations

Sequential creation involves progressive construction created with common written text or shared visual image.

Written text — Students start a sequential text by writing the first few stanzas of a poem. They then send their work to students in a different school, who read the stanzas already written and add their own. This process continues as the text is shared with other schools.

Visual image — These collaborative art projects are progressive construction of visual images. Each square on the grid is a small image created by a participating artist. View examples on the Internet site <http://www.ibiblio.org/sito/>

Career Activity File — Employability Skills

Problem Solving (continued)

Parallel Problem Solving

A similar problem is presented to students in several locations. The students solve the problem separately at each site and then share their successful problem-solving methods electronically.

Teachers provide mathematical word problems to teams of students to solve, but the teams contain groups of students from different schools. Students must use telecommunications tools to coordinate problem-solving efforts, the selection of solutions to submit for evaluation, and the writing and presentation of these solutions according to a standard format.

Simulations

International Student Space Simulations is an exciting, dynamic teaching method that challenges students to design, construct, and live in a self-contained habitat for an extended period of time. It is a multilevel, interdisciplinary, action-based program that enables students to apply what they have learned.

This simulation involves student astronauts who communicate with Mission Control technicians (also students) via two-way radios, modem-equipped computers, and/or VCR cameras and monitors. Inside the habitat, astronauts perform experiments, engage in simulated docking maneuvers, retrieve and repair satellites, and prepare meals. listserv@jhuvvm.bitnet

Social Action Projects

Internet can serve as a context for “humanitarian, multicultural, action-oriented telecommunications projects” that involve the future leaders of our planet — our children.

The Global Schoolhouse, Project Registry, is a clearinghouse of more than 750 on-line collaborative projects, organized by topic, grade, and project date. Schools can join an existing project or register their own. <http://www.gsn.org/>

Electronically adapted with permission from “Opportunities in Work Clothes: On-Line Problem-Solving Project Structures” by Judi Harris, *The Computing Teacher*, vol. 21 no. 7, Copyright © 1994, ISTE (International Society for Technology in Education), 1.800.336.5191 (U.S. & Canada) or 1.541.302.3277 (Int'l), iste@iste.org, <http://www.iste.org>. All rights reserved.

Problem Solving (continued)

Problem-Solving Steps

1. Define the Problem

The Situation

The income I make is my weekly allowance of \$10. The stereo I want to buy will cost \$145. **What is the problem in the situation?** I want a stereo.

2. Identify Options

Make a list of the things you can do about the problem. That option will then become your solution. For each solution, what are the rewards or what will happen next?

Possible Options

What Will Happen Next?

Try to earn more money.	Try to find a job.
Buy a cheaper stereo.	I want that stereo, not a cheaper model.
Borrow money from my parents.	I could pay them back \$5 a week.
Ask for the stereo for a gift (Christmas, birthday).	I don't want to wait that long.

3. Identify Best Solution

Think about each option and pick/decide which option is the best for you. Think about what might happen if you do this.

Solution Try to earn more money.

Possible Results Stereo gets bought.

4. Plan How to Achieve the Best Solution

Think about what you will have to do to get there and what resources you might need to use.

Solution Try to earn more money.

Resources Contact friends and neighbors.

Plan Locate a summer job (mowing lawns, baby-sitting).

5. Evaluate Results

If your problem is still not solved, go back to the list of options and choose another. Follow the same steps.

Results Stereo is bought.

Stereo doesn't get bought — Go back to Step 2.

6. Evaluate the Entire Process

- Did you make the best choice from your options? If not, explain.
- What choices, if any, did you make out of mere habit?
- What choices were well thought out?
- What choices were not well thought out?
- What would you do differently next time?

Source: http://literacy.kent.edu/salt_fork/prob_solv/define_intro.html

Solve other problems on-line: Family/Work Issues, Workplace Issues, Community/Work Issues

Resources: Information Literacy in All Subject Areas
<http://www.big6.com/showarticle.php?id=40>

K-Adult Problem-Solving Steps <http://www.big6.com>

Problem Solving (continued)

Problem-Solving Steps Worksheet

1. Define the Problem

State the situation.

What is the problem in the situation?

2. Identify Options

Make a list of the things you can do about the problem. That option will then become your solution. For each solution, what are the rewards?

Possible Options

What Will Happen Next?

3. Identify Best Solution

Think about each option and pick/decide which option is the best for you. Think about what might happen if you do this.

Solution

Possible Results

4. Plan How to Achieve the Best Solution

Think about what you will have to do to get there and what resources you might need to use.

Solution

Resources

Plan

5. Evaluate Results

If your problem is still not solved, go back to the list of options and choose another. Follow the same steps.

Results

6. Evaluate the Entire Process

- Did you make the best choice from your options? If not, explain.
- What choices, if any, did you make out of mere habit?
- What choices were well thought out?
- What choices were not well thought out?
- What would you do differently next time?

Source: http://literacy.kent.edu/salt_fork/prob_soln/define_intro.html

Problem Solving (continued)

Marshmallow Geometry

Activity

The purpose of this activity is for students to demonstrate desirable skills for interacting with and relating to others to describe the importance of cooperation among workers in accomplishing a task.

Activities

- Have the students pair up.
- Have a large supply of marshmallows and toothpicks available for the students to construct shapes.
- First, have one student in each group construct a simple geometric shape, and have the other student duplicate that shape.
- Second, have one student in each group arrange several marshmallows in a pattern on the table, then describe that pattern to his/her partner, who then duplicates that pattern based on verbal instructions from the first student.

Note: The second student may *not* see the pattern.

- Discuss the activity by asking such questions as:

What was the hardest part of the project that you did?

What was the most enjoyable part?

Did you like working with a partner? What did you like about it?

Did you and your partner agree on what to do?

Why is it important for people to work well together?

Evaluation

Students will be evaluated on how well they worked together, participation, and discussion.

Materials/Supplies

Small marshmallows, toothpick halves, paper plates, plastic knives, colored pens/pencils or crayons

Related Subjects

Art
Math
Language Arts

National Career Development Guidelines

Competency VII

Awareness of the importance of personal responsibility and good work habits

Suggested Oklahoma P.A.S.S. Concept

Elementary
Partnerships and Problem Solving

Resource: Career Development Activities, Elementary CS1100. Order by calling 1-800-654-4502.

Problem Solving (continued)

Jobs of the Future

Activity

“The more things change, the more they stay the same.” Or do they? Some do and some don’t. This activity will explore how occupations have changed from yesterday to today and how they may change in the future. Students will brainstorm ideas of jobs in the future and illustrate their visions on posters.

Activities

- Have the students choose an occupation for which they have a strong interest. Have them print the job description from *Oklahoma Career Information System (OCIS)* software or the *Occupational Outlook Handbook*.
- Lead a class discussion of how occupations have changed over the years.
- Have the students brainstorm possible technological advances of the future and how they might affect occupations in 5, 10, and 20 years.
- Ask the students to rewrite their job descriptions as if it were 20 years in the future. Do they see major changes (if so, what are they), or will the occupations stay the same?
- Have the students design advertisements or posters illustrating their selected occupations today and how they think they will be in the future. Display them in class.

Evaluation

- Students will be evaluated on their participation in class discussions, brainstorming advances, predictions for the future, and posters of their selected occupations today and in the future.
- Job descriptions of the future.

Materials/Supplies

Computer, *Oklahoma Career Information System (OCIS)*, paper, pencil, art supplies, poster board

Related Subjects

Art
Instructional Technology

National Career Development

Guidelines

Competency VIII
Understanding how work relates to the needs and functions of the economy and society.

Suggested Oklahoma P.A.S.S. Concept

Middle School/Junior High
Brainstorming
Problem Solving

Resource: Career Development Activities, Middle/Junior High, CS1101. Order by calling 1-800-654-4502.

Problem Solving (continued)

Careers Requiring Problem Solving

Activity

Select two occupations from the list below that sound interesting to you and, using the resources, tell how they use problem solving in their daily work.

Occupations

Judge
Management Analyst
Detective
Industrial Designer
Psychiatrist
Auto Body and Related Repairer
Plumber
Meteorologist
Surveyor
Computer Scientist
Watch Repairer
Biological and Medical Scientist
Optometrist
Auditor
Architect

Occupation 1 _____

Occupation 2 _____

Related Subject

Language Arts

National Career Development Guidelines

Competency VI
Skills to locate, evaluate, and interpret career information.

Suggested Oklahoma P.A.S.S. Concept

High School
Research
Problem Solving

*Resources: Occupational Outlook Handbook
www.bls.gov/oco
Oklahoma Career Information System*