

# What Classroom Activities Reflect Constructivism? (Activities)

Translating theory into constructivist-based practices can be guided by a number of key design principles. Murphy (1997a) summarizes Jonassen's (1994, p. 35) eight principles for guiding instructional design as follows:

1. Provide multiple representations of reality.
2. Represent the natural complexity of the real world.
3. Focus on knowledge construction, not reproduction.
4. Present authentic tasks (contextualizing rather than abstracting instruction).
5. Provide real-world, case-based learning environments, rather than predetermined instructional sequences.
6. Foster reflective practice.
7. Enable context- and content-dependent knowledge construction.
8. Support collaborative construction of knowledge through social negotiation

With these guidelines in mind, the following activities are offered to reflect instructional materials that are process oriented, problem based, contextual, interdisciplinary, and metacognitive in nature. They provide examples of ways teachers can incorporate constructivist practices of teaching and learning into their *instruction*, *curriculum*, and *assessment* practices.

Each activity begins with a description of the constructivist pedagogy addressed in the activity, the teaching strategy to be used, the learning activity that describes the problem or situation to be addressed, the evaluation criteria to be conveyed to the students, the operational steps to guide student learning, and a set of reflective practices.

The activities are organized by theme and title (e.g., Curriculum Practices: Applied Learning Designs), not by topic or level of difficulty. The activities span various disciplines. It is the responsibility of the teacher to modify the activities, making them more

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simple or complex, to meet learner learning needs and instructional/occupational standards of the school, state, or profession.

Murphy's (1997c) checklist of constructivist characteristics is reprinted here as a guide for reviewing the implementation of these and other activities in the instructional setting. Although not all characteristics may be evident in each activity, the list provides a tool for reflection. Through ongoing collaboration in modifying the constructivist-based activities selected for use in the classroom, teachers can model the behaviors and practices expected of the learners.

### Checklist

<b>Characteristic</b>	<b>Supported</b>	<b>Not Supported</b>	<b>Not Observed</b>
Multiple perspectives			
Student-directed goals			
Teachers as coaches			
Metacognition			
Learner control			
Authentic activities			
Knowledge construction			
Knowledge collaboration			
Previous knowledge			
Problem solving			
Consideration of errors			
Exploration			
Apprenticeship learning			
Interrelated concepts			
Alternative viewpoints			
Scaffolding			
Authentic assessment			
Primary sources of data			

Source: Murphy, Elizabeth. "Constructivist Checklist." In *Constructivism: From Philosophy to Practice* by E. Murphy. Summer 1997c. < <http://www.stemnet.nf.ca/~elmurphy/emurphy/cle4.html> > Reprinted with permission.

## Summary of Classroom Activities that Reflect Constructivism

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### Curriculum Practices

1. Applied learning designs
2. Interdisciplinary integration
3. Field-related experiences
4. School-community linkages

### Instructional Practices

5. Experiential learning
6. Problem-based learning
7. Student-directed learning
8. Mentoring

### Assessment Practices

9. Journal writing
10. The scoring rubric
11. Portfolios
12. Observation checklists

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**Curriculum Practices**

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## Applied Learning Design

This activity involves the application of mathematics to the solution of a real world problem. Students direct their own searches for information, incorporating the use of Internet technology. They conduct interviews with people in the social community, analyze information, and engage in the physical construction of a blueprint or model using relevant occupational tools. The principles of applied learning and constructivist pedagogy are used to promote students' understanding and application of math concepts through social, contextual, and experiential methods of learning.

Applied learning strategies are used to lead students to the solving of authentic problems. Teamwork, collaboration, exploration, and negotiation are highlighted learning concepts. Open-ended questions are used to guide inquiry. Small group discussions and interaction are used to facilitate learning.

A local company has contracted with your company to design a prototype deck that could be mass produced at their manufacturing facility, assembled on site, and sold to homeowners in the Sun View subdivision. There are approximately 300 homes in this subdivision and most have east or west exposure. Corner lots are allocated for recreation space.

Your task is to assemble groups of 4-5 learners to prepare group designs for the prototype deck. Each group will need to make a presentation to the client to promote its design. The presentation must include the following:

- A scale drawing or blueprint containing specifications of the deck.
- An explanation of the aesthetic and utilitarian value of the proposed design.
- A justification of the design in regard to the availability of materials and ease of parts assembly.
- A comprehensive materials list, including how the pieces will be identified for final assembly at the site of final installation.
- A cost estimate for materials.
- A description of the process that will be used to assemble the deck.
- An estimate of assembly time and numbers of workers per deck.

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\*This activity is a modification of the "Deck Design" problem noted in *Applied Mathematics: Targets for Learning* p. 330 (Vocational Instructional Materials Laboratory 1998).

Note: The company will pay a bonus if the presentation includes a three-dimensional scale model.

## Evaluation Criteria

The Applied Math Project Rubric (p. 58) will be used for evaluation. An evaluation of “unacceptable” or “marginal” will result in rejection of the project and a maximum timeline of 1 week to bring the project up to standard.

## Operational Steps

- STEP 1** Work together with students to assess their qualifications for problem solving by discussing with them—
- prior experiences, knowledge, and/or skills each student brings to the problem situation, and
  - new knowledge and/or skills students must acquire to perform the activity, e.g., blueprint drawing, knowledge of the various characteristics of building materials, math calculation skills, and knowledge of construction principles.
- STEP 2** Engage student work teams of 4-5 students in discussion and negotiation of strategies to use in preparing the deck design. Have each team prepare a list of steps they will follow in the inquiry process.
- Provide access to relevant resources, emphasizing those available on the Internet. Offer guidance on strategies for interviewing local deck builders to learn the standards the deck designs must meet to acquire building approval.*
- STEP 3** Bring the teams together for a sharing of their plans for inquiry.
- Facilitate discussion by writing on a flip chart the inquiry ideas presented by the teams. Ask questions to prompt further thinking. For example, “How could you learn about the deck preferences and requirements of potential homeowners?”*
- STEP 4** Have the work teams reassemble to discuss and refine their lists.
- Circulate among the teams, asking open-ended questions to trigger learners’ thinking about any inquiry steps they might have overlooked.*
- STEP 5** Have each team determine the responsibilities of individual team members. For example, will all members of the team perform the same steps or will each member have an individual activity, such as

finding out what materials are stocked by local suppliers, determining the prices of various materials, locating samples of various deck designs, conducting a survey of customer needs, and so forth.

*Observe the teams' delegation of responsibilities to ensure that all learners have a role in the problem solution.*

Engage teams in performing the responsibilities they have laid out in preparation for the client presentations.

## **STEP 6**

*Offer guidance as necessary by demonstrating a procedure and helping students to follow your performance model, gradually decreasing your assistance throughout the process.*

Have the teams practice their presentations to the client. Circulate among the practicing teams to discern whether or not they are justifying (giving reasons for) as well as describing their deck designs.

## **STEP 7**

*If necessary, ask questions to guide students' reflections and critical analysis.*

Host the team presentations.

## **STEP 8**

*Play the role of the client. Ask questions for clarification of ideas as necessary.*

Have students reflect upon the various resources used for their initial inquiry. How would they streamline or target their efforts should they encounter a similar problem in the future?

## **Reflective Practices**

Ask students to identify the unique characteristics of group members that contributed to the team product and presentation.

Discuss the transferability of the knowledge acquired through this project by asking students to consider why and how they might modify their deck designs if the subdivision was located in another part of the country, e.g., mountainous areas.

Engage the class in a discussion of qualities about each presentation that they especially liked and any suggestions they might have regarding subsequent presentations.

*Make notes of ways you might promote continuing knowledge development among future students based upon the directions the teams have chosen to pursue problem solving.*

**Evaluation**

Have all the teams use the rubric included in this activity as a way to critique their team's as well as the other teams' presentations.

*Critique the presentations against the rubric also. Review all comments with each team, providing them with feedback and guidance for that could help them in future efforts.*

**Applied Math Project Rubric**

<b>Difficulty</b>	<b>Unacceptable</b>	<b>Marginal</b>	<b>Acceptable</b>	<b>Exemplary</b>
<b><i>Depth of Thought</i></b>	Major gaps are evident. Little or no reasoning is demonstrated.	There are major gaps in reasoning. Reasoning is somewhat apparent, but is flawed.	Reasoning is apparent, but a few minor gaps or flaws exist.	Reasoning is clear, concise, and effectively demonstrated.
<b><i>Presentation</i></b>	Oral presentation is characterized by haphazard, sloppy, or missing information.	The presentation lacks major points of emphasis and/or information is not provided in a professional manner.	The presentation is pleasant, pleasing, and informative and is clearly designed around informing the intended audience.	The presentation mimics professional quality. The message is clearly articulated to the intended audience.
<b><i>Feasibility</i></b>	The project solution is clearly not possible within the parameters set forth by the problem.	The solution may not be possible within the parameters of the problem, unless modified.	Although the solution is valid, it may not be easily replicated	It is clear that the method of solution is valid and can be easily replicated.
<b><i>Attention to Detail</i></b>	The project is generally characterized by superfluous or surface knowledge.	Only a few questions are answered in detail. The work generally does not attend to the underlying detail required.	Most of the questions posed by the problem are directly answered in detail.	Questions are anticipated and addressed. All measures, scales, and other required annotations are documented.
<b><i>Creativity</i></b>	The approach to the project is a direct replication of a previous design.	No new ideas are demonstrated; some novelty is shown, however.	The design is similar in approach to others, but unique characteristics make it stand out.	The approach to the design is fresh, novel, and unique

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## Interdisciplinary Integration

Interdisciplinary curriculum often uses a problem-centered approach for instruction, which involves students in solving problems that matter to them and/or their community. This activity is designed to help students recognize the broad scope of information required for problem solving, the interrelatedness of academic and vocational skills, and the value of multiple perspectives. It encourages individual initiative, self-directed learning, dialogue, and metacognition. Knowledge is constructed through negotiation in the social community of practice.

Interdisciplinary integration is facilitated through team teaching, inter-departmental planning, and thematic projects. Key ideas from each discipline are addressed collaboratively among teachers whose interactions model teamwork. These ideas are then communicated to students who must pool their strengths to solve the ill-structured problem. Learning is grounded in the context of real-world applications. Manipulating information, critical thinking, and in-depth understanding are learning concepts promoted through inquiry.

A local apartment complex is trying to decide whether or not to stock the lake in the middle of the complex with fish that could eat the algae and keep the waters clean. Stocking the lake will cost \$3,000-\$9,000 more than is currently being spent on algae removal, depending upon the type of fish selected. The cost of stocking the lake will be assessed to the 50 residents of the apartment complex over the next 3 years. The apartment complex is new and survey findings indicate most of the residents will stay at least 3 years. The owners of the complex have requested that your firm submit a proposal that recommends a decision and presents a strategy for implementing it.

Your task is to engage your students (the firm employees) in meeting the owners' request. (You will need to identify a body of water to serve as the lake.) Divide the class into 7 groups and present the groups with their tasks for contributing to the problem solution.

*Marketing (English).* Write an article about the project for a news release to the local newspaper. Use good grammar. Edit the final copy.

*Advertising (Commercial Art).* Create a brochure to publicize the issue. Conduct interviews to obtain facts about stocking lakes and the aesthetic value they offer the community. Write the text using

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correct English. Lay out and design the brochure using established principles of design.

*Civil Engineering (Mathematics)*. Measure the lake to determine the number of cubic yards or acres. Calculate the number of fish required for the lake. Also calculate the cost per resident for each type of fish under consideration. Prepare a report of this information to share with the other departments of the organization.

*Environmental Resources (Vocational Education)*. Investigate the characteristics of several kinds of algae-eating fish. Analyze the algae and lake water characteristics along with the environmental conditions to determine which fish will be most effective in reducing the algae and able to live in the lake. Also investigate the life span of each type of fish being considered. Prepare a multimedia presentation to share this information with the other departments.

*Chemical Engineering (Chemistry)*. Test the algae and the lake water to determine their characteristics. Illustrate these characteristics on a chart or other visual.

*Accounting (Business)*. Establish a payment plan. Determine whether to offer payment options, e.g., yearly deductions in a lump sum; yearly deductions prorated over 12 months; one single deduction in the first year for the 3-year amount. Investigate the tax benefits of various types of payments. Create a table to explain the information you have gathered.

*Data Processing (Computer Technology)*. Develop a spreadsheet on which to record apartment resident payments.

Point out that none of these tasks can be performed in isolation. Therefore inter-group as well as intra-group collaboration will be required.

## **Evaluation Criteria**

Each student will be required to write a project summary that (1) describes how academic and vocational skills were used to solve the real-world problem and (2) demonstrate skill applications through written, oral, audio, or visual symbols, e.g., spreadsheet, report, table, presentation. The criteria of accuracy, comprehensiveness, clarity of expression, and visual/audio appeal will be applied for summary assessment.

## Operational Steps

Have each group (company department) plan its strategy for completing its task, including plans for interacting with other groups to obtain necessary information. The groups should also identify the information they wish to gather from each group.

### STEP 1

*Provide relevant resources, but also direct students to reflect upon the prior knowledge they bring to the project task, e.g., knowledge of chemistry, knowledge obtained through work-related experiences.*

Engage students in task performance.

### STEP 2

*Ask students to present their ideas about how and from whom they might obtain necessary information and/or guidance. Use student input as a basis for further guidance.*

Have students keep journals in which they describe not only their accomplishments and difficulties, but also their feelings and attitudes at different stages of the discovery process.

### STEP 3

*Circulate among groups when students are in class, coaching them through the process of thinking and reasoning, defining new problems, and crafting solutions. If they need help in developing their visuals for presentations, demonstrate how the task could be done and then help them to create their own designs by asking leading questions.*

Bring the groups together to plan their presentation to the customer and to practice their execution of the perspective report.

### STEP 4

*Engage the entire class in a discussion of the qualities of the presentation that they considered good and those they believe need improvement. These qualities should be generally stated, e.g., more enthusiasm, good description of facts, larger type in visuals.*

Conduct the final presentation.

### STEP 5

*Ensure that all students have an opportunity to present their findings without criticism or other negative reactions from the other “workers.”*

Have students reflect on the scope of information their groups uncovered during their inquiry into the problem.

## Reflective Practices

Ask students to describe how the work of one group facilitated or complemented the work of the other groups. What were the primary concerns, knowledge, and skills of the respective groups?

Have each group of students make a list of the academic and vocational skills they used to complete their tasks and share those lists in an “all-group” session.

*As the vocational teacher, describe how students occupational task performance is hampered by lack of basic skills. As the academic teacher, identify the major barriers to students' learning the basic skill, e.g., not realizing the value of learning “school” subjects.*

## **Evaluation**

Have students prepare their summaries and lists of commonly used skills in problem solving. Suggest that they include a graphic to illustrate how the knowledge and skills addressed in various academic and vocational classes were used for problem solution. Assess the audio, visual, oral, and written demonstrations of student learning as exhibited in their summaries, using accuracy, comprehensiveness, clarity of expression, and visual/audio appeal as criteria.

## Field-related Experiences

In a transdisciplinary or field-based integration model, teachers expand the boundaries of the classroom, creating opportunities for students to learn or practice skills and knowledge in the field or at a worksite. In this activity, students visit a worksite of their choice, make observations, interpret what they see and hear, discuss and debate the on-the-job application of given knowledge and skills, and reflect upon the interrelatedness and value of academic and vocational education in the real world of work. By interacting with workers on the job, students are able to obtain relevant, up-to-the-minute information to help them expand their thinking about the workplace and their preparation for work in it.

Seeing first hand what is being done at worksites can enlighten any educator—academic or vocational—who is attempting to prepare students for the future and the workplace. Often, as a form of professional development, teachers visit worksites to learn first hand how skills and theory taught in the classroom are used on the job, which can help them to plan meaningful worksite visits for their students. More importantly, as teachers discover and discuss the connections they see between different content areas, they can better discern the types of questions they can ask to lead their students to make their own connections between school and work. Scaffolding, asking open-ended questions, and actively engaging students in learning are a few of the teaching techniques promoted in this activity.

The Madison School District has made a commitment to integrate academic and vocational education in its four high schools. One of its efforts is to expand classroom boundaries. Its administrators have asked you to identify criteria to use in assessing the relevance of field-related experiences that can serve as a prelude to workplace internships. Your task is to engage students in developing a set of criteria to use in assessing the relevance and quality of worksite visits, test the utility of the criteria, and revise the list based on reflection and feedback. As a preamble to this activity, engage in a worksite visit with other academic and vocational teachers and use the information you gather through your visits to mentor and guide student efforts.

The criteria students establish in conjunction with their teacher at the onset of the activity will be used as a basis for self-reflection and peer review.

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## Operational Steps

**STEP 1** Engage a team of academic and vocational teachers to visit a given worksite with you. Prior to the visit, meet to determine the “who, when, where, and why” of the visit. To help focus your learning at the worksite, develop a set of basic questions to ask the employers and front-line workers regarding their job knowledge and skill requirements, including those that promote employability.

*As you observe and talk with workers at the job site, think about the skill standards you address in your curriculum and how those standards are being applied in the workplace.*

**STEP 2** Immediately after the visit, meet as a team to discuss your observations and share ideas about ways you can modify your curriculum and activities to bring students to an awareness of connections between school and work. Some options might include—

- arranging school visits by one or more of the employees that you and the other team members met during the visit; and
- making arrangements for students to engage in a worksite visit experience.

*Engage with colleagues in a discussion of such questions as the following (Norton et al. 1997):*

- *How might worksite visits inspire academic and vocational teachers to develop learning activities that will help students to understand the value of school learning?*
- *How might worksite visits motivate students to learn?*
- *What are some positive outcomes of the business/industry relationships established to accommodate worksite visits?*
- *What is one way in which you can adjust a segment of your curriculum to reflect the application of knowledge and skills in the workplace?*
- *What logistics are necessary to infuse an integrated activity in the classroom? Who? What? Where? Why? When?*

**STEP 3** Enlist a group of academic and vocational students to participate in a worksite visit experience. Meet with the team and describe their challenge, which is to plan, implement, and follow up a worksite visit.

*Share reflections about your worksite experience with the students by describing why the visit was of value to you as a person and as a teacher.*

Engage students' help in the development of criteria they can use to assess the quality of their worksite observations and investigations. List these criteria on the chalkboard or flip chart so students can continually refer to them to guide their performance. **STEP 4**

*Draw upon the criteria you and other teachers developed subsequent to your worksite visit experience as a tool for guiding students. Ask questions to trigger students participation in thinking about and developing the criteria upon which they wish their performances to be assessed.*

Have students brainstorm to identify the specific worksite they would like to visit and how that visit might promote their understanding of school and work connections. Help them in the brainstorming process by asking questions similar to the ones you had to answer to set up your own worksite visit. **STEP 5**

*Examples of questions to facilitate brainstorming:*

1. *Who or what worksite should you visit? Why?*
2. *What do you hope to learn at that worksite?*
3. *Where is the worksite located?*
4. *Why should you visit the specific worksite?*
5. *When shall you visit the worksite?*

Lead students to plan their worksite visits. Have them self-select their teams to be composed of 3 or 4 students who share similar interests. Give the teams the following directions: **STEP 6**

- Develop a set of basic questions to ask prior to and during the visit.
- Prepare a list of the academic, vocational, and employability skills you expect to see demonstrated in the worksite.

*Have students draw upon previous teachings and experiences that have helped them to form opinions about the application of skills in the workplace.*

Guide students through their learning experiences, ensuring that they conduct themselves well in the work setting. Provide them with some guidelines for acceptable ways to behave in their roles as observers and interviewers that you have gleaned from your own worksite experience. **STEP 7**

*Highlight a few of the courtesies students should afford the workers and companies they visit, e.g., following the visit, e.g., students should write letters of thanks to appropriate people at the worksite, also stating why the experience was meaningful to them.*

### **Reflective Practices**

Discuss with students their conclusions about the application of knowledge and skills in the workplace. Have them do the following:

- Identify the academic or vocational skills they observed being applied in the workplace.
- Identify the employability skills they saw demonstrated on the job.
- Describe the benefits of partnering with business/industry personnel to enhance learning.
- Describe the connections they observed among the different disciplines or content areas when applied on the job.
- Discuss reasons why separating knowledge and skill development into separate disciplines such as math, English, and vocational education is not a realistic reflection of what happens in the workplace.
- Present their ideas about activities that could be included in an integrated curriculum

### **Evaluation**

Use the criteria established at the beginning of the activity as a basis for student evaluation. Have teams explain ways they met the criteria and offer each other peer reviews of their self-analyses. Offer feedback to students, giving them guidance in ways to improve their learning through observation, questioning, and reflection.

## School and Community Linkages

Applying classroom skills to solve real problems of the social community is a critical feature of experiential learning. When reflection is added to the learning process and community service activities are fully integrated into the curriculum, the process is referred to as service learning. Service learning places students in decision-making roles that give them a sense of ownership in the problem, and in service roles that move them from passive receivers of service to active providers of service. Self-esteem, contribution to society, and a sense of self-worth are promoted through constructivist-based service learning activities (Fleckenstein 1997).

Although the purpose of a service learning activity is to enhance student learning through community service, activities must also forge an authentic connection between the school and community. This connection is realized by engaging students in real-life roles that expand their knowledge and skills, and increase their understanding of community issues, problems, and populations. Literacy skills are highlighted in the activity.

A local senior citizen center has contacted you to ask if your students could be enlisted to visit some of their residents and provide them with companionship. Your task, as the English teacher of students with low literacy skills, is to engage your students in providing companionship to these elderly persons in ways that will help them improve their literacy skills. For example, students could elect to talk to the senior citizens, read to them, discuss books they have read, interview them to learn their experiences living in a previous generation, etc. As a means of knowledge construction, ask students to write in journals their reflections about their exchanges with the senior citizens— what they did to provide service, what literacy skills they improved, what they learned about the lives of senior citizens.

Journal writing will be used as a means of helping students to assess their interactions and performances in ways that are meaningful to them.

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\*This activity was developed from an idea presented in Rural Clearinghouse for Lifelong Education and Development. ***Service Learning Benefits Students, Communities***. Manhattan: Kansas State University, 1995. (ED 391 620)

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- STEP 1** Set up the problem situation. For example, ask students to brainstorm ways they can work with senior citizens to improve their literacy skills. Some examples could include reading to the seniors, making checkbook calculations, reading and interpreting guidelines for getting medicare or medicaid reimbursements for medical expenses, and so forth. (Literacy deficiency can be at any level, depending upon your student population.)

*Write and post on the chalkboard or flip chart the literacy skills students hope to improve or acquire as a result of their service learning project. Offer suggestions as necessary to ensure that the academic and/or vocational literacy standards established for your state are among those identified.*

- STEP 2** Ask students to contact senior citizens with whom they have been paired. During the conversations, students should discuss their desire to be helpful, the skills they want to improve upon during their interactions with others, and the services the senior citizens might want them to perform, e.g., reading newspaper, writing letters. These discussions can take place over the telephone or in person, depending upon the desires of the parties involved.

*Role play appropriate telephone courtesies by assuming the role of senior citizen as students practice their telephone conversation skills.*

- STEP 3** Following an established time frame (allow 3-6 months for this activity), have students make regular contacts with their senior citizen partners.

*Provide ongoing coaching in the kinds of help students should provide as well as seek from the senior citizens. For example, some students might elect to engage the senior citizens in conversation by interviewing them to learn what it was like growing up in the “older” generation. They could record that information by taking notes or taping their conversations to transcribe at a later date. Activities that encourage mutual contribution (service) and reward (learning) should be encouraged.*

- STEP 4** Instruct students to make journal entries after each of their contacts to record what happened, what was said, what they learned, problems they encountered, and their feelings about the seniors and their experiences.

*Review and provide feedback to students regarding their journal entries and their verbal reports of interactions with their partners. Create scaffolding to help students move through any situations that are difficult and develop new strategies for maintaining good communication with others.*

At the end of the designated time frame, have students conclude their programmed involvement with the senior citizens by creating posters to give to their senior partners, illustrating the services they gave to the seniors, the services they received from the seniors, the competencies they have developed through the experience, and things they learned and value about the older generation as a result of their interactions.

## **STEP 5**

*Model appropriate courtesies by arranging for the class to visit the senior citizen center some evening or weekend and have a final party for the program participants during which students can share their posters with their partners.*

Ask each student to write a paragraph describing how this service learning experience has contributed to their knowledge development and to their motivation for further learning.

## **Reflective Practices**

Allow time for students to discuss their posters with the class, highlighting ways in which their knowledge about and attitudes toward senior citizens in the community have changed as a result of the service learning project.

Have students reread their journal entries and summarize (1) ways in which their communications have improved over time, (2) barriers to learning that they have had to overcome, and (3) new knowledge they have acquired about senior citizens in their community.

## **Evaluation**



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## Experiential Learning

In moving from school to work, the skill of working with others is vital to success. Many companies are embracing the teamwork approach to management and production as part of total quality improvement. Collaboration and teamwork, however, cannot be learned through reading, listening, and memorization. Students must be involved in collaborative experiences to gain a comprehension of the intricacies of personal interactions, group dynamics, and respect for the views of others. This activity involves students in the active construction of knowledge by having them work collaboratively with others to investigate a problem, negotiate solutions through “whole brain” involvement, and justify their recommendations.

Knowing how to work with others and to build upon the knowledge and experiences of diverse groups of people requires two skills crucial to students’ academic and career development—creative thinking and problem solving. This activity is designed to help students establish patterns for creative thinking that they can draw upon to solve problems in all aspects of their lives, both in school and out of school. It involves students in a shared responsibility for investigating a problem hypotheses. Working in teams, students pursue various approaches to thinking about a problem and share with each other their multiple perspectives of way to approach it. The value of incorporating different ways of thinking in devising problem solutions are highlighted.

The employees of a local hair salon want their owners to adopt an open floor layout at their salon. (Currently operators have partitions separating their stations.) The salon owners have asked the employees to present an argument in support of the proposed change in 12 working days. Your role is to involve students as “employees” of the company to investigate the open layout design and prepare a presentation to support it, applying different cognitive styles of thinking to the investigation process. Among the interactions required as employees collaborate to come up with a rationale are those of negotiation and conflict resolution.

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\*This activity was developed from the ideas presented in Leonard, D. and Straus, S. “Putting Your Company’s Whole Brain to Work.” *Harvard Business Review* 75, no. 4 (July-August 1997): 110-113.

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Criteria developed collaboratively by students and teacher will be used for peer assessment of successful task performance. A questionnaire will be used to obtain feedback on each group's portion of the presentation.

## Operational Steps

**STEP 1** Identify the goal of the investigation and state students' roles as follows, dividing the class into four groups of company employees:

Group One: Prepare an argument to support the proposed open layout by using analytical thinking. For example, this group of employees could conduct research to determine the benefits of open architecture and ways to overcome its drawbacks. They could also analyze the cost implications of converting to an open layout floor design.

Group Two: Prepare an action-orientated argument that examines implementation issues. For example, this group of employees could find and present information about how long the office conversion will take, new furniture that might be needed, acoustical issues, and so forth.

Group Three: Prepare a people-oriented or emotional argument to support the proposal. For example, this group could discuss how an open layout might affect interpersonal relationships among operators and clients, how the setup might affect worker morale, and how the concerns of operators who prefer to work in isolated booths could be addressed in an open layout scheme.

Group Four: Prepare an argument from a future-oriented perspective. For example, this argument could include graphics or blueprints of the proposed layout.

*Give students a chance to ask questions to clarify their assignments and responsibilities.*

**STEP 2** Involve students in a brainstorming session to explore techniques they might use for their investigations. For example, techniques could include interviewing students, parents, and/or community members who frequent salons to learn their opinions about open store layout; reading research data, technical publications, or

periodicals on salon layouts to learn the latest trends and the rationale for adopting them; and communicating over the Internet to obtain additional information and resources.

*Model using the World Wide Web to locate resources. Show students how to locate associations from which they could obtain information and how to link with appropriate listservs. Give students an opportunity to practice Web use while you watch and guide their practices. Then, release the learning responsibility to them.*

Establish with students the criteria by which they can assess their arguments for open floor layout.

### **STEP 3**

*Give students leadership in brainstorming meaningful criteria, but also provide resources such as established math, drafting, and communication standards that students can draw upon in establishing the performance criteria by which their reports will be assessed.*

Engage the employee teams in their respective forms of investigation. Underscore the importance of respecting underlying differences of group members and provide guidelines for intragroup interactions, e.g., everyone has a chance to agree with or object to a point of view, reasons for each perspective must be given.

### **STEP 4**

*Keep the goal—preparation of an argument in support of open layout—at the forefront of students' minds. Be available as a reference person, guiding students and asking them questions to help them clarify their thoughts so that they can present them verbally.*

Bring together the four groups and have each group select one spokesperson to present its argument. Allow enough time for divergent (brainstorming) discussion to uncover imaginative alternatives and convergent (action planning) discussion to arrive at the best points to highlight in the client presentation.

### **STEP 5**

*Facilitate the execution of good group dynamics. Do not allow one approach to dominate the discussion time so that the entire class may arrive at the best rather than the first viable option.*

Engage the groups in final collaboration to highlight the points to be included in the client presentation. Remind them that owners of the salon, as well as the salon's customers, reflect the same variety in thinking styles as those demonstrated by the salon employees.

### **STEP 6**

*Depersonalize conflict as a means of collaboration and solution building. Intellectual disagreements can cause a great deal of tension in any group, yet successful outcomes require the cross-fertilization of different ideas. Most business projects require collaboration between people who think and perceive information in different ways. Therefore, the presentation will be most effective when it satisfies whole brain thinking.*

- STEP 7** Have students brainstorm the questions they would like to place on a questionnaire for the salon staff to answer in assessing their presentation. Questions such as “What did you especially like about the presentation?” and “How could the presentation be improved?” will give feedback that students can draw upon for future persuasive arguments.

*Support rather than lead students.*

- STEP 8** Have students make their final presentation before another class. This class should be told their role as “salon staff.”

### **Reflective Practices**

Engage students in a discussion of critical thinking by asking them to identify the qualities of a good thinker. Write the qualities on the chalkboard as they are presented.

Ask students to volunteer words that describe what good collaboration looks like and sounds like to them. Fill in the words on a T-Chart as they are given. (See the following example.)

#### *Looks Like*

Smiling faces  
Eye contact  
Nodding head  
Questioning looks  
Handshakes

#### *Sounds Like*

“That’s good!”  
“I like that”  
“I was thinking . . .”  
“How about . . .”  
“How can we . . .”

Discuss how collaboration is demonstrated. For example, does one group talk while the other groups listen? Does collaboration mean that each group does a segment of the work and then put the parts together to form a report or recommendation? Why? Why not?

Ask students to describe ways in which looking at a problem from various frames of reference might help them to arrive at better problem solutions.

Have students review the evaluation forms completed by the salon staff audience and prepare lists of the best qualities of their presentation and the qualities they need to improve upon. Also have them assess their ability to complete their tasks successfully by using the criteria they established at the onset of the activity. Each of these items may be placed in their portfolios of work samples, if desired.

## **Evaluation**



## Problem-based Learning

Little classroom instruction is devoted to solving problems for which there are no definite answers. More typical of instruction is the  $2 + 2 = 4$  philosophy, which encourages rote memorization rather than critical thinking. Most problems of the real world, however, have any number of possible solutions that are dependent upon available information and the individuals involved. This activity involves students in the actual experiences of solving a problem that has real-world significance beyond school. It affords a connection with constructivist pedagogy in that it contains academic challenges that provide a focus for knowledge development and real life scenarios that cast students in roles they may actually assume or have assumed in real life.

Using ill-structured problems—problems that have no one right solution—is an instructional strategy used to promote critical thinking and problem solving within the context of real world applications. By thinking through ill-structured problems, students are able to expand and refine their knowledge through self-directed searches for information, active discourse with others, analysis of conflicting ideas and appeals, and decision making. “Problem-based learning is apprenticeship for real-life problem solving” (Stepien and Gallagher 1993, p. 26).

The Performance Checklist included at the end of this activity will be used for student assessment. Post a copy of this checklist in the classroom for students to use as a guide to your expectations.

The Randolph Street School Board is interested in offering several high school courses over the Internet. Students would be able to take these courses without attending school, accessing the information from their home computers and communicating with their teachers and other classmates through e-mail. Due to the fact that not all students have access to home computers (although they are available at the library), and because students would not need to be physically present in class, the suggestion is an issue. The parties affected by this decision would be students, parents, school faculty, and the business community. Your company has been asked to investigate the issue and come up with a recommendation to present to the school board.

### Constructivist Pedagogy

### Teaching Strategy

### Evaluation Criteria

### Learning Activity Scenario

## Operational Steps

**STEP 1** Have students identify an hypotheses for problem solution.

*Brainstorming can be used as a strategy for compiling a list of issues relative to the problem.*

**STEP 2** Identify the roles of problem solving groups. Explain that there will be four teams of investigators to prove or disprove the hypotheses, with each group representing one of the four types of stakeholders— people from business and industry, school faculty, high school students, and parents. One member of each team should be chosen by the team members as the panelist who will represent them at the public forum to be held in 2 weeks at the school board meeting.

*Encourage student self-selection of Internet user roles to assume, based on the focus of their interest.*

**STEP 3** Describe each team's responsibility, which is to gather information in support or rejection of the hypotheses. Each panelist's responsibility is to present his/her team's rationale for or against censorship of Internet usage in the classroom.

*Engage in scaffolding by helping students to connect their responsibilities to various methods of application. For example, use questioning to help them clarify their roles and ways to perform them, letting their responses direct the way you offer leadership.*

**STEP 4** Initiate the research part of the investigation by guiding the four groups to appropriate resources, including the Internet. Additionally, provide the teams with background information on censorship and the students' right to know.

*Provide primary sources, along with manipulative, interactive, and physical materials to encourage inquiry.*

**STEP 5** Brainstorm with students other methods for obtaining information, such as interviewing community members, conducting surveys, and personally soliciting opinions of parents and other students.

*Guide students in ways to structure questions to use in interviews. Circulate among and coach students as they attempt to follow your model.*

Engage students in critical thinking and reasoning. Have team members work together to identify the facts and values that surround the problem and develop criteria to evaluate the appropriateness of information available on the Internet.

## STEP 6

*Explain that because social issues are often the basis for ill-structured problems, students should give special attention to values—ethical, economical, moral, legal, environmental, health, and safety-related values—when devising problem solutions. Ask open-ended questions such as “What is important to the students, parents, schools, and community?” “What ethical issues are involved in the decision?”*

Facilitate problem resolution by having team members collaborate with each other to identify possible solutions to the problem and prepare a rationale supporting or rejecting the censorship of Internet usage. Prompt students to relate the value principles they used to guide their decisions and offer facts to support those principles.

## STEP 7

*As leading questions such as “What information is reliable?” “What are some possible options to the issue of Internet courses?” “What will happen if . . . (pros and cons)?”*

Direct students to make a decision based on the consensus of the four groups.

## STEP 8

*Monitor the exchange of information and discussions among students and guide students toward conflict resolution if necessary.*

Have students discuss the importance of various perspectives on Internet courses obtained through their research. Ask them to identify how the omission of one of those perspectives might alter the decision they made.

## Reflective Practices

Have students identify how values (medical, academic, family) influence decisions about which solutions to ill-structured problems are the “best” ones. Ask them to offer examples of how bias is reflected in the way data are interpreted.

Engage students in a discussion of how each type of information is important to consider in solving an ill-structure problem.

Involve students in debriefings about the team activity:

## Evaluation

- “What was most difficult for you in the team activity?”
- “What was one of the most positive things to come from your team interactions?”

Have teams assess their own process of problem solving by responding to the following questions. (See the Performance Checklist.)

### Performance Checklist

Part 1: To what extent were the following guidelines for team interactions followed:

<b>Item</b>	<b>Always</b>	<b>Sometimes</b>	<b>Rarely</b>	<b>Never</b>
The specifics of the problem were clearly identified by the team				
Sufficient information was gathered for review				
Several perspectives to the problem were considered by the team				
The pros and cons of each recommendation were presented				
The solution was unanimously selected				

Part 2: Identify the extent to which the following practices were evident in your team interactions:

<b>Practice</b>	<b>Always</b>	<b>Sometimes</b>	<b>Rarely</b>	<b>Never</b>
Demonstration of good listening skills				
Free submission of ideas for group consideration				
Demonstration of respect for the opinions of others				
Active consideration given to all suggestions				
Negotiation with others to reach team agreement				



## Student-directed Learning

New approaches to teaching and learning reflect a movement from the traditional teacher-directed classroom to a learner-directed environment of collaborative, participatory, and continuous learning. The self-directed learner is “neither independent or dependent, but interdependent, forming new understandings through dialogue, feedback, and reflection with fellow learners and facilitators” (Kerka 1994, p.2). This small-group activity leads students to develop new understandings of work in a given occupational area by engaging in dialogue about past experiences, obtaining feedback about the value and meaning of those experiences, and reflecting about their learning and the learning process.

Small group learning is sometimes avoided because teachers and students are unfamiliar and/or uncomfortable with a process that engages them in problems and issues of social interaction, conflict, dominance, and gender. The small group, however, has many advantages: it encourages critical thinking, teamwork, and problem solving; it enhances students’ self-esteem by helping them realize they have much to offer other group members as a result of their experiences; it broadens the expertise of group members; it helps meet the diverse and complex needs of learners; and it eases the distinction between teachers and learners, creating an environment that is less hierarchical than traditional environments (Imel et al., 1994). Small group learning is the teaching approach highlighted in this activity.

Jason Technology has been experiencing a high rate of turnover among its employees. Although all new employees have been screened to show that they have the knowledge and skill required for their positions, they tend to quit or be fired soon after they are hired. The personnel department wants your company to develop a strategy its staff can use to learn about their applicants’ employment needs so that they can better match workers to jobs. Your task is to engage your employees (students) in small group activities to produce a document (e.g., questionnaire, survey, table, chart) for Jason’s staff to screening applicants. Encourage students to pursue their preferred styles of learning to obtain information: personal interview, Internet or e-mail chats, online literature searches and reviews, and so forth.

Student-directed goals and objectives will provide the basis for self-assessment and peer review of student achievement.

### Constructivist Pedagogy

### Teaching Strategy

### Learning Activity Scenario

### Evaluation Criteria

## Operational Steps

**STEP 1** Establish small group roles. Divide the class into five groups and present the following group functions. Ask the groups to negotiate among their members to determine if all group members will perform the same role, separate roles, or combinations of roles.

**Facilitator** (helping the group to work together)

**Researcher** (finding resources and information to facilitate knowledge and/or skill development)

**Writer** (describing on paper the process the group follows to develop new knowledge and/or skills)

**Presenter** (telling other groups what members did to develop the knowledge and/or skill)

**Timekeeper** (monitoring the time the group spends on each part of knowledge/skill development)

*Give students leadership in establishing these roles through negotiation. However, explain that it is acceptable for all students to be the researchers and to also have another function as well, such as researcher and facilitator.*

**STEP 2** Set group goals and objectives. Direct each group to collaborate in determining one occupational area to investigate, the information they wish to obtain, and the ways in which they will conduct their investigations. Have them state these decisions in goal and objective statements and post them on the wall for ongoing reference throughout the learning experience.

*For example, the group may have the goal of learning more information about a career as a “professional golfer.” Their objectives may be to (1) identify things about playing competitive golf that they like and dislike; (2) give examples of prior experiences that have led them to their perspectives about competitive golf; (3) list attitudes and values that are consistent with successful golf play; and (4) describe ways in which learning new information about the life of a professional golfer has influenced their decision to pursue the career choice or select another one. Work collaboratively with students in each group to negotiate the final goals and objectives.*

**STEP 3** **Facilitator:** Guide facilitators to ask leading question to trigger brainstorming and discussion about the information the group hopes to obtain, how the group will obtain that information, and from whom the information will be acquired. For example, students might want to know how a person who works in the chosen occupation combines work and family life; students could interview

workers, read magazine articles, search the Internet, use e-mail to find and communicate with workers through chat groups, listservs, and associations.

*Monitor the facilitators' ability to realize the open exchange of ideas among group members and ensure that all members have a chance to speak and be heard.*

**Researcher:** Have researchers engage in various means of investigation to obtain the information the group has agreed to seek, e.g., work-related likes, dislikes, attitudes, knowledge, skills, conflict areas, and so forth.

**STEP 4**

*Provide resources, give suggestions, guide.*

**Entire group:** Engage each small group in finding the information identified by the group, using sources deemed appropriate by the group. Reconvene the groups and have them discuss what each member learned through investigation. After discussion of the findings, have the groups discuss the meaning and value of the information the groups gathered, and determine what information each group will convey to others and how that information will be conveyed.

**STEP 5**

*It will be important to coach the facilitator in his/her role during this period of group interaction. The facilitator should encourage group members to think for themselves, proceed with minimal direction, express their ideas clearly, and engage in reflection to reconstruct their understandings of work in the occupation.*

**Recorder:** Guide the recorder to write descriptions of the group's process for learning, the value of the unique information the group gathered during its investigation, the group's reaction to the workers' comments, and any comments by group members that indicate awareness of the need to continually update skills.

**STEP 6**

*Coach recorders to be attentive to continue recording processes, behaviors, difficulties, conflict, and so forth and to avoid distractions. It is important that all aspects of the group interaction be recorded so that students can later reflect upon their learning processes.*

**Presenters:** Engage presenters in deciding how they will present the information gathered by the group. Offer guidelines regarding the amount of detail expected for the presentation.

**STEP 7**

*Encourage the use of various methods, e.g., use of graphics, audiovisuals, charts,*

**STEP 8** *All class members:* Engage all class members in a large-group discussion of the categories of information they touched upon in their investigations. Also discuss what information the class believes will be especially useful to them in making career decisions. Discuss how learning about the personal experiences of people in their social environments can influence a person's decision to become involved in various school, family, or other life experiences as well as occupational ones.

*Facilitate the small-group discussions.*

### **Reflective Practices**

Engage students in discussion of the following questions:

- What was difficult about working in the small groups, e.g., sharing experiences, determining what was to be conveyed to others, giving and receiving feedback? What was the easiest?
- How was learning expanded because of the interactions within their groups?
- How did having specific group roles contribute to the completion of the activities?
- What skills were needed to perform in each group role?
- How was the activity relevant to each student's lifelong learning process?

### **Evaluation**

Have each group of students assess their performance in meeting its goals and objectives. Then, have them gather feedback from others by asking the other groups to assess their group's performance.

## Mentoring

Mentoring is not a new concept. Over the years, it has been provided in both informal and formal ways as a technique for improving the quality of learning in social, family, and work environments (Lankard 1996). This activity involves students in the active process of helping others to learn through mentoring relationships. In keeping with the constructivist theory that promotes authenticity in learning, students draw upon their prior knowledge about a subject area and their process for learning, share and test their understandings and strategies through engagement with others, and develop new knowledge about the learning process through social interactions and negotiation with others.

Mentoring offers a way to facilitate students' intellectual, personal, and social maturity as well as occupational development when related to skill development. It can be used as a strategy for helping one perform a task, develop new academic and vocational knowledge and skills, and alter behaviors. Bagley et al. (1994), in describing their "shared-ownership" technology model for restructuring the classroom, promote use of mentoring (reflective classroom management) in combination with cooperative learning, project-based learning, computer use, authentic assessment, and student empowerment.

Five retired plumbers were recruited to serve as mentors to students in a vocational education class. They provided mentoring on an informal basis, as needed. However, last week they decided to adopt a more formal approach to mentoring and have asked your advisors to prepare a set of guidelines they could use to help their students reach their learning goals. Your task is to engage your students, as the team of advisors, in developing a mentoring rubric for the plumbers' use. The rubric must include the performance criteria and standards by which mentoring can be assessed.

The Mentoring Rubric at the end of this activity will serve as a model for evaluation of the students' rubric and of their mentoring performance.

Introduce the concept of informal mentoring by connecting mentoring to students' social and school experiences. For example, have students identify experiences they have had when a friend, parent, or sibling acted as a mentor to them in helping them

### Constructivist Pedagogy

### Teaching Strategy

### Learning Activity Scenario

### Evaluation Criteria

### Operational Steps

#### STEP 1

complete a task such as car maintenance. For example, ask the following types of questions:

How did you learn how to maintain a car? Did anyone give you *advice*? How was that advice given? Did the mentor *list* the things you were required to do to maintain the car? Did the mentor *criticize you* when you forgot to perform a maintenance step such as adding windshield wiper fluid? Did the mentor *compliment* you when you performed a step well? Did the mentor *tell you* how you could improve your car maintenance, e.g., rotate the tires regularly? Did the mentor *show you* a better way to do something, like waxing the car? Did the mentor *take you* to the workplace to show you how auto mechanics perform a task such as changing the spark plugs?

*As students share ways in which mentors have helped them learn, write the key terms on the chalkboard, e.g., advising, demonstrating, and encouraging.*

**STEP 2** Introduce the concept of formal mentoring by describing it as a process by which individuals follow a structured set of guidelines to lead others to indepth knowledge about a concept, rather than one isolated task. Explain that formal mentoring requires a long-term commitment of time and on-going involvement of a qualified person whose purpose is to help learners achieve certain learning goals.

*Give students an example of a long-term mentoring relationship that you have observed in school or on the job as a means of helping them connect to the concept.*

**STEP 3** Engage students in a discussion of the kinds of ongoing activities that mentors engage in to provide guidance, support, and coaching. Following a constructivist classroom practice, ask students to elaborate on their views before presenting your own.

*Consider ways to elicit the following ideas that should be considered by students:*

- *Meeting with the person you are mentoring over breakfast or lunch to discuss his/her progress in learning or understanding an issue.*
- *Exchanging notes of encouragement and progress with the person you are mentoring.*
- *Having the mentee visit your place of work or a place that reflects the student's career or special interests.*

- *Inviting the person you are mentoring to go to a professional meeting with you.*
- *Helping the person you are mentoring with a special project.*
- *Providing resources that the student can use to find out more about a subject.*

Engage students in a discussion of the criteria they would use to evaluate successful mentoring. As recommendations are given, record them on the chalkboard or flip chart. When students have exhausted their ideas on the subject, have them make a final selection of the criteria to include on a rubric. Also have them distinguish three levels of performance.

#### **STEP 4**

*Use the Mentoring Rubric on the last page of this activity for guidance.*

Engage students in a mentoring experience by pairing them with students from another class (in a lower grade) who require help in their academic or vocational knowledge and skill development.

#### **STEP 5**

*Collaborate with another teacher who shares an interest in this activity and establish the goals for each student's mentoring, e.g., developing skills for applying technology principles of electricity, fluid dynamics, and thermo dynamics to solve problems of the real world.*

Have the mentors work independently and with the student they are to mentor to plan the mentoring experience. For example, the mentor may decide to—

#### **STEP 6**

- write notes of encouragement to the student on a regular basis,
- ask the student to study with him/her periodically, and
- design exercises the student can use to practice an application.

The mentor and student may decide to—

- meet regularly to review learning progress,
- schedule times for special tutoring, and
- locate resources for use in learning.

*Facilitate but do not lead students in their decision making. Encourage self-directed learning.*

Have students participate in the mentoring activity. Give them a time frame for their involvement as mentors, e.g., 1 month. Allow time for student mentors to share their practice and progress at mentoring.

#### **STEP 7**

*Serve as a mentor yourself, giving the student mentors encouragement and recognition for their efforts.*

### **Reflective Practices**

Gather the mentors together in a group to discuss the following questions:

- Why is mentoring mutually beneficial to the mentor and to the person receiving mentoring?
- How can mentoring lead to improved self-image and self confidence?
- In what ways could mentoring help students to link school to work?

*Prompt student to provide personal examples to support their answers*

### **Evaluation**

Have mentors complete the mentoring rubric to assess their performance. Also, have the students who received mentoring complete the rubric to indicate ways in which their mentors helped or failed to help them. Discuss the two completed rubrics with each student as a form of feedback to guide learning.

## Mentoring Rubric

<b>Criteria</b>	<b>Levels of Performance</b>		
	<b>Poor</b>	<b>Good</b>	<b>Excellent</b>
Maintained regular mentor/student meetings	Met only if asked	Met at least once a week	Met 3 times a week at set time and place
Showed personal interest in the student	Asked questions that involved a yes/no response	Asked a mix of yes/no and open ended questions	Asked open-ended questions
Discussed issues of importance to the student	Told your views only	Shared viewpoints about issues	Focused on student's interests
Used relevant personal experiences to make a point or provide explanation/example	Talked about other students	Used examples of nationally known figures	Used examples from personal life
Demonstrated a process for doing something, e.g., performing a math calculation, when appropriate	Referred student to the textbook	Performed steps yourself while students observed	Led student step-by-step through the process
Visited a work-related site with the student	Observed workers at site	Shadowed a worker at site	Interviewed a worker at site
Provided help/assistance in performing a task	Performed the task yourself	Discussed ways to perform the task	Offered suggestions to guide student
Offered support and encouragement	Complimented only on final product if done well	Complimented on successful steps only	Complimented on some aspect of each effort



**Assessment Practices**



**CLASSROOM ACTIVITIES**

## Journal Writing

Reflective journal writing is an effective tool for self-assessment in that it engages students in thinking about certain ideas and experiences and envisioning new ways of responding to them. This activity combines journal writing with the use of technology as a means of extending constructivist learning in the classroom. It engages students in working on an Internet-based project that is meaningful and challenging, places them in control of their learning, enables them to work collaboratively with a diverse community of learners, and connects them with expert workers.

Journal writing as an authentic tool to guide reflection, self-assessment, and learning. It provides students with an opportunity to record what is happening in their lives and clarify their feelings, attitudes, beliefs, and values so as to develop self-knowledge and inspire self-directed learning. The teacher's role in promoting reflective journal writing is that of coach and mentor, helping students to focus on the what is happening in the moment and using that information to guide future participation in life events.

The local Chamber of Commerce wants to produce a publication describing some of the top careers in the local area. Your task is to engage students in developing this publication by having each of them focus on a specific occupation of interest. Information for this project must be acquired, synthesized, interpreted, reviewed, revised, and presented in final form through use of Internet technology, e.g., listserv exchanges, e-mail communication, private journal writings, and public postings on the Internet.

Evaluation of students' performance will be based on their demonstrated ability to—

- plan, organize, and monitor the collection of relevant information about a self-selected occupation;
- work collaboratively with others to gain multiple perspectives about problem issues and solutions; and
- reflect new understandings through journal writings that convey thoughts, assumptions, and arguments.

Evaluation of the publication will be based on its acceptability to the Chamber of Commerce. A rejection of the publication will require writers to revise it within a 1-week period.

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\*The idea for this activity evolved from reading Ravitz (1997).

### Constructivist Pedagogy

### Teaching Strategy

### Learning Activity\* Scenario

### Evaluation Criteria

## Operational Steps

**STEP 1** Have students select the occupations they wish to investigate.

*Provide resources of occupations common in the community. Include company brochures, yearly reports, and so forth.*

**STEP 2** Help students establish their teams. For example, a student may select mentors, teachers, students with similar interests, members of relevant associations, and parents to be part of his/her interactive learning team.

*Help students to use communication technology to locate individuals to serve on their teams.*

**STEP 3** Introduce students to several kinds of communication channels they can use in their project work:

- Listserv exchanges through which team members can share their research findings and ideas with each other;
- E-mail exchanges between the student and teachers and/or other mentors through which students could present their work for review and feedback;
- Private journal writings in which students can record their thoughts and feelings about their experiences, including frustrations, insights, and issues to address sometime in the future; and
- Public postings on the Internet that can be read by all Internet users.

*Demonstrate the use of these four channels of communication available through Internet technology. Coach and guide students, helping them to make use of all four channels as they engage in project activities.*

**STEP 4** Ask students to begin their projects by publicly posting requests for resources over the Internet and World Wide Web. These information searches should be for human as well as print resources, e.g., names of subject matter experts, professional organizations, and/or colleagues.

*Encourage students to interact with resource people other than those on their listservs, or to add others to their listservs as interested parties are discovered. For example, an applied science teacher could be consulted for information about new technologies in the field, mathematics or statistics teachers could be valuable resources for data related to the field, e.g., growth figures, stock performances of small and large businesses in*

*the field. Also prompt teams to share their planning, learning, and development approaches across teams.*

Encourage students to share their research findings, including names of contact persons, with the people on their listservs. Ask them to make entries about their processes for inquiry to share with others and to solicit feedback.

#### **STEP 5**

*Observe students as they work, providing “scaffolding” to help them engage in listserv exchanges. Help them to connect what they are learning to what they already know.*

Have students use e-mail to communicate with their teachers and other mentors/learners. Their exchanges can consist of ideas for performing the project activity, problems they are encountering, and any other information or questions for which they would like to receive feedback.

#### **STEP 6**

*As the facilitator, it will be easier for you to communicate one on one with students over the Internet than it is during a classroom session. Immediate feedback is important to enable students to make adjustments to enable them to advance in their learning. It also gives you an opportunity to compliment and encourage students so that they are motivated to continue learning.*

At regular intervals or key points in the investigation, remind students to write entries in the personal journals they have created in their program files. Encourage them to record descriptions of problems they have encountered, solutions they have tested, lessons they have learned, plans they have changed, and new directions they are taking. Also ask them to reflect on their feelings, attitudes, and perspectives about these issues.

#### **STEP 7**

*Stress the importance of documenting these experiences thoroughly and regularly as a way to retain opportunities for reflection, dialogue, and feedback.*

Offer continuing guidance and support as students move forward in their investigations of relevant information, decisions about what data to include in the publication, and their strategies for developing and distributing the final publication.

#### **STEP 8**

*Although students must be encouraged to direct their own learning process for this project, offer ongoing support and encourage them to interact with classmates in large and small groups.*

**STEP 9** Have students publicly share via electronic communications various portions of their writings and to ask for feedback from those Internet users.

*In presenting the product for review, guide students to include the objectives of the project and the type of feedback they seek so they can revise as necessary.*

**STEP 10** After students have reviewed and revised their writings, engage the entire class in preparing the final publication for the Chamber of Commerce and in distributing it to the public through an Internet entry or through linkage to the Chamber of Commerce website.

*Facilitate students in their attempts to do this. Enlist a member of the Chamber of Commerce to conduct the review.*

### **Reflective Practices**

Divide the class into five groups. Ask each group to formulate an answer to its assigned question and present that answer to the class:

- Group 1: In what aspects of my life can I follow a similar process for learning by using new communication technologies?
- Group 2: What learning concerns did the experience bring to mind?
- Group 3: In what way were values reflected in the experience?
- Group 4: What new insights about myself did the experience trigger?
- Group 5: How did (or didn't) reflection about the experience change the way I think?

Ask students to reflect upon interpersonal communications and social interactions over the Internet. Use the following questions to guide this reflection:

- In what ways did you feel comfortable (or uncomfortable) exchanging ideas over the Internet?
- What channels of communication did you use most frequently to communicate your feelings? Why?
- Was it possible to assemble a geographically, socially, and culturally diverse team? If yes, explain how this was accomplished. If not, describe the factors that prevented this from happening.

Point out to students that journal writing can be assigned criteria against which assessments can be made. These criteria could be

specified in a rubric, for example, and related to the following (Allenspach et al. 1996, p. 80):

- Reflectiveness
- Depth of response
- Number of entries
- Originality
- Use of concrete images
- Length of response
- Descriptive words
- Evidence of thoughtfulness
- Creativity
- Connections to other subjects
- Responses to posed question or lead-in statements
- Connections to a life experience

If desired, have students link performance standards to journal writing. Have students create a rubric to assess their reflective journal writing, using criteria like the ones listed and identifying the varied levels of performance. (Assigned weights are optional, depending upon the intent of the experience.)

Conduct assessment of the project objectives by determining the extent to which they demonstrated achievement of the process objectives. Public sharing and Chamber acceptance of the document meets the criteria for successful evaluation. Offer feedback regarding both process and product so that students will be directed to learn from their experiences and be able to transfer that knowledge to other situations and project work.

## **Evaluation**



## The Scoring Rubric

Constructivist learning requires students to demonstrate in-depth knowledge of a concept and an ability to apply that knowledge in real-world situations and practices. This activity involves students in developing resumes, discussing the relevance of key components, preparing drafts for purposes of testing appropriateness and obtaining meaningful feedback, revising the resume based upon relevant input, and preparing the resume for final presentation. The performance-based rubric is used as a tool for authentic assessment, helping students to evaluate how well they have met the criteria for acceptance, determine where they are in the learning process, and what they need to do to move forward.

The scoring rubric aids the assessment process by providing to students at the onset of a learning activity clearly defined performance targets for reaching agreed-upon standards. “A scoring rubric consists of fixed scales related to a list of criteria describing performance. Each scale is composed of anchors that describe the various levels of performance complexity. Assigned weights, which give the relative value of each criterion, are used in the process of scoring to ascertain whether the standards have been met” (Allenspach et al. 1996, p. 10). To the extent possible, rubrics focus on the characteristics of understanding, rather than on fragmented bits of information. They are designed to aid in evaluating the quality of a student’s work, not the quantity of work performed. The scoring rubric is a strategy for connecting all aspects of the learning process— instruction, performance, and assessment. The purpose of this activity is to engage students in using the scoring rubric to guide their task performance and self-assessment of their learning progress and performance.

The Ellison Local High School has invited the Get It Together Employment Agency to hold a workshop session on resume preparation for the school district’s annual “Career Week.” As the training director for Get It Together, you have been asked to help students who register for the session to develop resumes that will be well received by future employers. Your task is to engage students in the construction of a rubric by which they can assess their resumes for acceptability to potential employers, preparation of their individual resumes, and subsequent assessment of their completed resumes using the criteria they identified in the rubric.

A resume writing rubric will be constructed by students with assistance from the teacher and used to evaluate their self-prepared resumes.

**Constructivist Pedagogy**

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**Learning Activity  
Scenario**

**Evaluation Criteria**

## Operational Steps

**STEP 1** Describe to students the task they are to perform and ways their performance will be assessed for this activity so they can visualize the attributes required of the final product.

*For example: post where visible to the class the following performance objective: Prepare a resume to use in a job search according to the standards established by the class. Also post the knowledge and skills to be assessed as follows: “Given a list of information typically required on a resume, the student will—*

- *compile the information,*
- *select a type of resume to prepare,*
- *prepare a draft copy of a one-page resume,*
- *edit the resume to correct any errors, and*
- *prepare the final copy of the resume.*

**STEP 2** Ask students to discuss “What makes a good resume?” Then, have them brainstorm criteria for assessment and the standards by which they will determine their levels of progress toward the performance standard.

*By using open-ended questions, lead students to an awareness of the following criteria and ratings:*

*Criteria:*

- Neatly typed*
- Attractive format*
- Accurate information*
- Complete content*
- Well organized*
- Correctly edited*

*Standard Levels:*

- Excellent as presented*
- Requires corrections*
- Must be redone*

**STEP 3** Engage students in assigning weights to the criteria, e.g., the highest number should be assigned to the most important criterion for successful task performance. Allow time for student discussion of recommendations so all points of view are able to be considered. Promote the use of negotiation skills to help students arrive at a consensus about the weight to be assigned to each criteria.

*Use the following example to guide your manner of facilitating student learning, being careful to guide students so that they devise an example similar to the one that follows rather than having that example presented to them for acceptance:*

<u>Criteria</u>	<u>Weight</u>
<i>Neatly typed</i>	<i>3</i>
<i>Attractive format</i>	<i>1</i>
<i>Accurate information</i>	<i>4</i>
<i>Complete content</i>	<i>4</i>
<i>Well-organized</i>	<i>2</i>
<i>Correctly edited</i>	<i>3</i>

List on a flip chart or chalkboard the types of information typically presented on a resume and describe each category. For example:

#### **STEP 4**

- Personal Data. This includes name, social security number, mailing address, telephone number (including area code).
- Career Objective. The career objective should be a one-sentence statement that indicates the job desired (e.g., sales), the desired responsibility (e.g., sales person), and the relevant skills (e.g., communication)
- Formal education and training. This includes the names and locations of schools attended, the dates you entered and left the school, special courses of study, grade point average
- Special skills. Job-related skills should be noted here along with any other relevant skills. (Point out that people get paid for *using* knowledge, not *having* knowledge.)
- Work experiences. This list should provide information about specific jobs the applicant has held and the job duties he/she has performed, and tools and technologies used.
- Special awards and memberships in professional organizations.

*Distribute completed copies of resumes as samples for students to review.*

Direct students to compile the information they need to prepare their personal resumes.

#### **STEP 5**

*Serve as a mentor, helping students to determine where they can find the information they need and who they might need to talk with to locate information about which they are unclear.*

Once students have gathered the information for the resumes, ask them to select a format to use and direct them to put the information in draft form.

#### **STEP 6**

*Provide students with examples of resume formats or direct them to the appropriate resources.*

**Reflective Practices**

Engage students in a discussion of the value of using a scoring rubric to assess other school work and using that assessment to help them plan where to direct their future efforts.

Have students discuss the advantages of developing rubrics for self-assessment of performance in occupational task areas, e.g., repairing lubrication and cooling systems for an auto mechanics occupation.

**Evaluation**

After all students have prepared draft copies of their resumes, have them critique their own copies using the rubric they prepared. Allow time for students to continue working on their resumes to improve them and to obtain constructive feedback from other students to guide their efforts.

## Portfolios

Assessments from a constructivist perspective focus on generally defined outcomes that are constructed by teachers and students as they advance through the process of learning. This activity engages students in using the portfolio as a tool by which to construct meaning. It engages students in the compilation and selection of items to include in the portfolio. Because the portfolio represents the processes of learning over time, it is a record of learning itself. Meaning is individually constructed by students through review and analysis of its varied contents and purposes for inclusion. “The constructivist approach puts a premium on the selection of items that reflect learning from the student’s perspective” (Paulson and Paulson 1994, p. 1).

Portfolios represent a new model for assessment in which the student is a full stakeholder in the process. They offer the teacher a strategy for helping students to determine their own purposes for various demonstrations of learning and a resource from which to make informed instructional decisions that are consistent with student needs. Because they can be used to promote student/teacher collaboration in developing criteria and standards for work evaluation, portfolios represent a total learning environment, forging a connection between instruction and assessment (ibid.).

The election of officers for a professional association will take place in 6 weeks. The candidates for the offices will be asked to submit evidence to support their qualifications for the positions. Your task is to engage students as potential candidates and ask them to determine the qualities about themselves that they would like to highlight and collect evidence that they possess those qualities.

Evaluation will be based on students’ interpretations of the value of their portfolio contents in demonstrating their leadership qualities. An election of officers will serve to provide feedback on peer review of the campaign.

Involve the class in discussion of the qualities they would seek in those elected for office. As suggestions are given, write them on the chalkboard. Require students to give a rationale supporting the value of each quality in regards to leadership. For example, “Why is ‘enthusiasm’ important for the person in an officer position?”

### Constructivist Pedagogy

### Teaching Pedagogy

### Learning Activity Scenario

### Evaluation Criteria

### Operational Steps

#### STEP 1

*Facilitating discussion so that all students feel free to submit ideas without judgment or critique from others is a key function for the teacher.*

**STEP 2** Next, have the class brainstorm the characteristics and behaviors that reflect each of the qualities they noted. For example, a person who has enthusiasm may be characterized as being “fervent,” “passionate,” “spirited.” He/she may demonstrate this quality by volunteering time and energy to work on special projects for the association. Note the characteristics and behaviors suggested for each quality listed on the chalkboard.

*Ask various open-ended questions to encourage the presentation of ideas or ask students to role-play how a person could physically display a quality.*

**STEP 3** Ask each student to make a list of the four or five qualities he/she would like to highlight in his/her campaign and to prepare his/her own definitions of those qualities.

*Encourage students to come up with words and definitions that are meaningful to them.*

**STEP 4** Engage students in their interpretations of evidence they could compile to reflect the qualities they have decided to publicize.

*Use open-ended questions and scaffolding to help students identify the kinds of evidence that could use, e.g., feedback about oral presentations, posters designed to promote a class function, etc. As each student will have his/her own unique skills and abilities, the evidence should reflect that uniqueness.*

**STEP 5** Have students, over the next 6 weeks, select products, photos, projects, drawings, and evidence of applied technology such as an electrical circuit board to include in their portfolios to reflect the qualities and characteristics they have identified.

*Be available to give input and feedback during this period of time and offer encouragement to prompt students’ enthusiastic engagement in the portfolio experience.*

## **Reflective Practices**

Have students describe ways in which portfolios present a more comprehensive and complex picture of learning.

Ask students to debate the value in evaluating all parts of the portfolio rather than each item individually.

In this activity, assessment guided instruction. Engage students in brainstorming to identify ways this practice is demonstrated in a business organization.

Have students share the portfolios they have assembled and describe the rationale they used to select contents they believe illustrate their qualifications as officers. (The interpretation and reflection phase of this activity is especially important as it engages students in the process of making meaning of what they have done and learned.) Then have the class actually vote for officers based on the evidence that has been presented.

## **Evaluation**



## Observation Checklists

Observation is a significant way to learn what is happening— what the classroom is like, what students are doing, and what learning is taking place. In keeping with constructivism, observation checklists provide a tool for self-reflection and self-assessment. Their authenticity is dependent upon their use as a method of recording observations through which students can discern where they are on a continuum of knowledge and skill development. This activity will involve students in the development of an observation checklist they can use to determine what skills they have acquired and the extent to which they have mastered the skill based on observable criteria so that can engage in planning for improvement.

Reflection is a key part of knowledge construction. It provides a point from which change can be made. However, reflection requires focus that allows the individual to shift gears from what is known to how that knowledge can be operationalized or applied, to the development of new knowledge and testing its viability. Observation checklists highlighted in this activity are used to provide a guide for future development, engaging students in a strategy that will help them learn ways to assess their own performance before they acquire or retain bad habits.

You have been asked to develop an observation checklist that teachers, business managers, and community groups can use to determine the extent to which the physical arrangement of the rooms in which they conduct education and training classes facilitate learning. Your task in this activity is to engage students in developing this checklist of physical characteristics that facilitate learning and using it to assess the extent to which education and training rooms reflect these.

A student-developed checklist of the characteristics of physical environments of classrooms that promote student involvement and participation in the learning process will be used for assessment and serve as a guide for continued learning.

Involve students in brainstorming ways in which the physical arrangement of a classroom can promote learning,. Ask questions to draw from students suggestions such as the following (Marlowe and Page 1998):

### Constructivist Pedagogy

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### Operational Steps

#### STEP 1

- promoting student participation,
- motivating learning,
- encouraging interaction and collaboration,
- instilling pride in work,
- encouraging participation, and
- modeling of skills.

*Clarify the meaning of these learning outcomes if necessary. Emphasize that the suggestions must refer to items that are observable, e.g., learning tools relevant to the learning concept, such as leveling instruments to use in surveying, are available for use.*

**STEP 2** After the brainstorming, have the students refine the list acquired through brainstorming. Have them synthesize the suggestions on the list, analyzing their value as guides for self-reflection and self-assessment.

*Ask students to justify their reasons for the suggestions they give and to provide an example of how the observable item contributes to learning.*

**STEP 3** Engage students in determining the standards by which they want their performance to be assessed. For example, do they demonstrate each performance “all the time,” “most of the time,” “seldom,” “never.”

*Review the following example of an observation checklist for classroom physical environment (Marlowe and Page 1998, p. 46).*

<u>Environment</u>	<u>All the time</u>	<u>Most of the time</u>	<u>Seldom</u>	<u>Never</u>
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*The walls are filled  
with student’s work*

*The furniture is arranged  
to facilitate learning*

*Everyone has a clear  
view of the teacher*

<u>Environment</u>	<u>All the time</u>	<u>Most of the time</u>	<u>Seldom</u>	<u>Never</u>
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*Furniture is moved  
according to the activity*

*Students have a say  
in arranging the classroom*

Allow small groups of students to practice their skill at arranging the physical environment of the classroom. Establish four or five groups and give each group 1 day to be in charge of the physical environment of the classroom.

#### **STEP 4**

*To help students in their planning, explain the classroom agenda for the days they will be practicing classroom arranging so they will know what activities to arrange for.*

Have students discuss reasons that some arrangements are more conducive to discussion (for example) than others. Ask them to give examples from their own experiences. For example, do family members eat around one table or in line on separate tables? Why?

#### **Reflective Practices**

As a tool for self-reflection and self-assessment, have each group use the checklist to assess the classroom environment it has arranged. Then, compare the self-assessments of the first group with the last group and note the learning progress that has occurred as the last group of students learned from the arrangements set by all previous groups.

#### **Evaluation**

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**CLASSROOM ACTIVITIES**