Title

Utilizing Technology in Creating a Problem-Based Curriculum

Target Audience

This course is intended for pre-service and in-service K-12 teachers.

Course Description

When teachers help students to develop problem solving skills, the students have the freedom, confidence, skills, and imagination to develop and structure their own learning experiences. This course is designed to give educators new strategies to help students state problems, pose questions, find answers, and ultimately see learning as a continuous interaction with their world. Learners will explore how technology can assist and enhance this process. As a final task, learners will craft a lesson plan that revolves around a problem to be solved—including a list of essential questions, activities to facilitate the problem solving process, and technology resources to support the research involved.

Facilitator

See instructor/facilitator sheet

Credits

To be determined by college or university

Standards

This course will help the teacher to meet NETS*T standards 1, 2, 3, 4, and 5; and students to meet NETS*T foundation standards 1, 3, 4, 5, and 6.

Goals and Objectives

Learners will gain:
• The ability to identify a suitable problem to solve.
• The ability to brainstorm and organize questions related to the problem.
• The ability to define a final student product and identify the activities needed to complete the product.
• The ability to develop steps and strategies to complete the activities needed to solve the problem.
• The ability to identify technology to facilitate and enhance both process and products.
• The ability to design assessments to determine student learning.

Outline of Content and Assignments

After previewing the course introductory information (Overview, Goals, Session Summary, Assessment, and Competency Map), learners will proceed to the Assignments section to complete the following seven sessions (or parts), working through each in order. In each activity, the learner will have access to numerous online resources from high-quality sources. Learners will also have access to video vignettes showing "best practice" examples for technology integration. The sessions are as follows:
    Session 1: Select a problem to be solved

Session 2: Brainstorm questions related to the problem and categorize them
Session 3: Define the final student product and outline activities
Session 4: Develop steps and strategies for activities
Session 5: Determine how student learning will be assessed
Session 6: Final project

<u>Session 1: Select a problem to be solved</u>

In Session 1, learners will choose a problem around which to build their unit. It is important to identify a problem that will arouse interest in students. Learners should choose a significant issue, a major event, or a serious real world problem that will motivate and "hook" their students.

Learners will:

View and reflect upon two videos

Read and explore
- "This is the Scientific Method," a description of the problem-solving and research process. Focus on: "Step 1 - Curious Observation" and "Step 2 - Is there a Problem?" (learners may explore the entire site, but it is not required).
- "Designing and Developing a Problem-Based Unit" Tutorial on how to design a Problem-Based Learning (PBL) unit. Breaks the process into easy to follow steps and provides examples of successful PBL units.
- Kids as Airborne Mission Scientists (KaAMS). A website designed for middle school teachers that provides authentic and contextualized problem-based learning lesson plans that were organized around NASA missions.
- *Project Planner: A Guide for Creating Curriculum and Independent Study Projects*, Dianne Draze, Dandy Lion Publications, ISBN 931724-54-6. Presents detailed information and ideas for topics, methods of obtaining information, and final products.

Submit
- Four potential problems with the curricular requirement(s), standard(s), and PMIs listed. Indicate which problem they will develop and briefly explain why this is a meaningful problem for students to research.

Participate in the online discussion

- Upon completion of the assignments, learners are to post and respond to ideas on the discussion board. Do you think it is better to give students problems that are open-ended, or problems that have a definite solution? Site examples from research or from personal thoughts and experiences. Learners are to respond to at least one other person's comments with suggestions or ideas.

<u>Session 2: Brainstorm questions related to the problem and categorize them</u>

In this activity, learners will identify the questions associated with their problem and put them into categories.

Learners will:

Read and explore
- "Free Brainstorming Training." Provides extensive information on the "what, why, and how" of brainstorming.

- "The Starting Block," a tool to help students shape their lack of knowledge about a topic into an active readiness to learn.
- "Innovation House." Resources, tools, tutorials and information for creative thinking, lateral thinking, problem solving, creativity and brainstorming.
- "Creativity, Innovation and Problem Solving." Guidelines for creative problem solving. Provides historical examples of innovations resulting from creative thinking.
- *Asking Questions, Finding Answers*, Dianne Draze, Dandy Lion Publications, ISBN 931724-10-4. Strategies for helping students ask good questions and make good decisions about subject matter.
- Graphic Organizer Index
  An index of 18 different types of graphic organizers. Examples and suggested uses are provided for each type of organizer.
- Graphic Organizers from WriteDesign On-Line
  More examples, arranged by five category types.

Submit
- Three or more question categories. Under each category, list the questions to be answered.

Participate in the online discussion

Upon completion of the assignments, learners are to post ideas in answer to the following scenario on the discussion board. Imagine a colleague comes to you for advice on how to use brainstorming with his or her lesson. Pick one (or more) brainstorming assignment to share with him or her and explain the benefits of this technique. Respond to at least one other person's post.

Session 3: Define the final student product and outline activities

In this activity, learners will describe the culminating product or activity that will demonstrate student learning and a solution to the problem. They will then use the question categories generated in Session 2 to develop an outline of learning activities.

Learners will:

Read and explore:
- "What is the Big6?" Explains the steps in the Big 6 Information Problem-Solving Approach.
- "The Osborn-Parnes Creative Problem Solving Process Manual," a method for generating novel and useful solutions to problems.
- *The Thinker's Toolbox*, Pamela and David Thornburg Dale Seymour Publications, ISBN 0-86651-467-8. Sixteen tools for promoting divergent thinking.
- *Blueprints: A Guide for Independent Study Projects*, Dianne Draze, Dandy Lion Publications, ISBN 931724-38-4. Presents a sequence of steps for various independent learning projects. Takes the learner from defining a study topic to presenting and evaluating the final project.

Submit
- A description of their culminating product or activity and an outline of their unit topics and process.

Participate in the online discussion

Upon completion of the assignments, learners are to post ideas and questions on the discussion board and answer the following question. As teachers, we don't want the products of projects to be uniform, but at the same time, an outsider should be able to tell that the products are from the same assignment. When students are creating these projects, what kind of guidelines should be given about the end product? Learners should respond with feedback to at least one other person's post.

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<u>Session 4: Develop steps and strategies for activities</u>
In this activity, learners will develop specific steps and strategies for implementing at least three activities in the unit.

Learners will:

Read and explore
- "The Lesson Plans Page - 10 Step Lesson Plan Guide." Presents key points in developing a lesson plan with descriptions of each of the components.
- "How to Weave Technology Into Any Lesson You Teach," a list of ways to connect technology activities to concepts learners are planning to teach.

Submit
- The steps and strategies for each of the activities in their unit. Learners should be sure to address what technologies they will use.

Participate in the online discussion

After completing the activities and reading, readers will share two to three great examples of how to "hook" students into learning a specific topic. If you are unsure how to hook them for a certain lesson, ask your fellow learners for help. Learners should respond to at least one other person's post.

<u>Session 5: Determine how student learning will be assessed</u>

In this activity, learners will develop a means for evaluating their students' work.

Learners will:

Read and explore
- "Assessment Advice & Forms," a collection of assessment advice and useful forms, rubrics, charts, and checklists to utilize and adapt.
- "Rubric for Assessment: Integrated Problem Solving Model," a scoring rubric for Big6 projects.
- "Rubistar," a tool to help teachers who want to use rubrics but do not have the time to develop them from scratch.
- *Time-Saving Procedures for Busy Teachers*, Bertie Kingore, Professional Associates, ISBN 0-9657911-4-9.

Submit
- Assessment guidelines for the activities developed in Session 4 and for the final unit product.

Participate in the online discussion

- Each of your students' projects may be different. How do you expect to grade them all fairly, and with equal merit? Share the plan you have with your fellow learners.

<u>Session 6: Solution or Final project</u>

Learners will:

Submit a final project

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- Before learners submit their final project, they should review their submissions. This will allow them to review the work they have done in order to complete their final project. They should make sure they are meeting each of the final project criteria. They should review each section to ensure that all are complete and have been edited for content and grammar. They may want to submit their project draft to a peer or colleague to assist with editing. When ready to submit the final project, learners should compile the following sections:
  - A problem that is relevant to the interests or needs of their students
  - A problem that is relevant to their curriculum, state or district standards
  - A list of essential questions
  - Three or more activities to facilitate the problem solving process
  - Technology resources to support the research and problem solution
  - A means for assessing student work

Look Back

Learners will go back to their online journal and read their response to the "Prior Knowledge" question they answered in Session 1. They will make a new journal entry that provides the following information:

Have you succeeded in learning about the areas you initially identified? Be specific.
What is the most important information you learned in this course?
What questions do you still have about using technology in creating problem based curriculum?
What new knowledge and/or techniques did you learn that you could apply to your practice?

Professional Goals and Expectations
Reflect on what you learned from the assignments, readings, discussions, and journal reflections you completed during this course. Then, go to your online journal and reflect on the following:

How does this learning experience compare with your goals and expectations?

Were there any professional goals you were unable to achieve? Why? How do you plan to address these areas of professional development in the future?

Additional Activity (not required)

Since this is the end of the course, why not spend a few minutes saying good-bye to your fellow learners? Go to the discussion board and enter the Virtual Café forum. Share your insights from this experience and wrap up any ongoing conversations.

Post-Course Evaluation Survey

Complete the Course Post-Evaluation Survey. The information you provide is very important, as it will help PBS TeacherLine to evaluate and improve courses.

Schedule

This course is scheduled to take approximately 30 hours to complete readings, activities, video, assignments, reflections, and a final project. If you find yourself spending several hours more than this in any given session, please contact your facilitator to make sure this is necessary to complete the given assignments.

Requirements

Learners are expected to:

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- Complete all assignments.
- Maintain an online journal.
- Participate and actively engage in discussions with fellow learners while contributing to the social construction of knowledge.
- Be self-directed and self-motivated.
- Ask for assistance when they need it.

Evaluation

This course is evaluated on a letter grade basis, and may be available for graduate credit. See graduate credit details pertaining to specific graduate credit institutions.

Materials (hardware, software, plug-ins)

Technical Requirements
- Word processor
- Internet service provider
- E-mail
- TeacherLine required plug-ins

Academic Dishonesty Policy

To be inserted by university institution only

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