

TIDEE

Transferable Integrated Design Engineering Education



UNIT 2: Creating Teams and Learning Problem Definition Skills

Session 2: Developing a Problem Definition, Part II

- **Developing Criteria (activity)**
- **Components of a Problem Definition (activity)**
- **Examples of Problem Definitions for Planning a Bike Trip**
- **Creating a Problem Definition (activity)**
- **Discovering the Team Identity (activity)**

Unit 2: Creating Competent Teams and Improving Problem Definition Skills

Session 3: Developing a Problem Definition, Part II

Announcements and Objectives for the Day (5 minutes)

- a. To produce a good sample of problem definitions.
- b. To gain feedback on the engineering design process.
- c. Build individual competency in how to create better problem definitions.

Testing and Refining the Definition (25 minutes)

Team's Synthesis of Results (10 minutes)

Each team will analyze the comments by their peers and make changes to their problem definition. The team will write the final version on an overhead transparency to present the results to the class and hand in for a grade. The intent is become better communicators on how to express problem definitions concisely.

Presenting Final Version of Problem Definition for a Bike Trip (10 minutes)

Each team is to present their *Problem Definition for a Bike Trip* and present their final version to the class on an overhead transparency. At the end of presentations, the instructor will collect the reports to review them and write comments on them about how they can be improved.

Identifying Steps Taken during the Planning a Bike Trip (25 minutes)

Each team will use ten minutes to discuss and identify the engineering design steps that their team took to develop as they developed their problem definition for the Planning a Bike Trip. Each team should identify specific examples that their team did in problem definition, idea generation, information gathering, evaluation and decision making and implementation. In addition, each team should be able to identify examples of process development and improvement, teamwork and communication skills. Use the TIDEE design process as a model. The instructor will lead a discussion to collect and synthesize the ideas.

Introduction to Possible Team Projects (10 minutes)

Included might be the ASME international design contest, a regional contest, or working with appropriate university design problems.

Assignment:

Gather information about the next project. If it is a contest, review the rules or the contest and come prepared to identify the design criteria mandated by them.

Activity: Testing and Refining the Definition

Objective: To see how effective the short problem definition is so that another team can create an acceptable bike trip

Tasks

1. Your instructor will direct you in exchanging problem definitions.
2. Read the problem definition assigned to your team.
3. Critique the problem definition and write comments on the sheet.
 - Is it too broad?
 - Does it contain enough information?
 - Is the solution too obvious?
 - Are there a variety of possibilities?
 - Is it easy to understand?
4. Within the best of your abilities, create a bike trip that would satisfy the other team.
 - When and where will the trip take place?
 - How many miles will be covered each day?
 - Where will the team sleep?
 - What equipment or supplies will be provided?
 - How are emergencies handled?
 - What support systems will be created?
5. Now, be creative and develop a funny trip that could be done from the problem definition. For example, did they mention that it had to be a bicycle trip on Earth? Then you might suggest a trip on Mars using a pogo stick.

Deliverables

- Team reporter describes their two solutions and states the difficulties encountered using another team's problem definition.

Criteria for Success

- Feedback is helpful to learn how to write better problem definitions.
- Serious trip plans would satisfy the customer.

Resources

- Eighteen minutes of team activity.
- Results from previous activities on *Planning a Bike Trip*.

Activity: Identifying Engineering Design Steps Taken in Planning a Bike Trip

Objective: To Understand How Often the Design Steps Are Repeated During a Design Process

Tasks

1. Assign new roles for each team member.
2. Review the steps and other components used in an engineering design process.
3. Determine when each of the steps, or parts of the steps, were used in the unit planning a Bike Trip.”
4. Identify the sequence and situation where each step was taken. Fill in the form for reporting “Steps Taken in a Design Process.”

Deliverables

- Team reporter prepared to describe examples of the engineering design steps taken during “Planning a Bike Trip.”
- Team reflector prepared to describe how the team is becoming a functioning unit and how this new team differs from the previous team.

Criteria for Success

- Team members have a better understanding of the design process.
- Class members gain insights on how activities have been connected together.

Resources

- Team’s participation in planning a bike trip.
- Slide of design process given during first day of class.
- Form for reporting “Steps Taken in a Design Process.”
- Ten minutes of team work time.

Reporting Steps Taken in a Design Process

Design Process Element	Description of Activity
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____
12.	_____
13.	_____
14.	_____
15.	_____
16.	_____
17.	_____
18.	_____
19.	_____
20.	_____

Elements:

Information Gathering, Idea Generation, Problem Definition, Evaluation and Decision Making, Implementation.

Other factors:

Process Improvement and Development, Communication Skills, Teamwork.

Summary of Steps Taken in Developing a Problem Definition

Instructor's Note: This work describes some of the components taken during the development of a problem definition for a bike trip. Since a problem definition is part of the design procedure, this will help clarify how difficult it is to develop good problem definitions. Many steps were taken to accomplish this goal.

Problem Definition

3 different trips

Plan a trip 1

Making funny story

Create a funny trip

Idea Generation

Brainstormed criteria

Information Gathering

Gave ideas (other) teams

Reading map

Sheets

Listing to expertise of others experience

Evaluation and Decision Making

Decision on funny story

Possible trips

Evaluated the sheets

Implementation

Turning sheets back

(Reporting)

Instructor's Note: During the process, a class was asked to use another team's draft of a problem definition for a bike trip to produce a reasonable bike trip and a funny one. These are an example of one of the team's efforts.

BIKE TRIP

Leave in June from Seattle on I-90 through Snoqualmie Pass. Use 20 speed mountain bikes. Destination Yakima over to Mt. Hood to Portland and then to Seattle.

FUNNY TRIP

Leave in December each person will have a bicycle (and Christmas hat), one speed, to cover 80 miles per day to get an intensive workout and will be given (MRE) military revisions emergency.

Activity: Discovering the Team Identity

Objective: To extract from recent team experiences a descriptor (logo or name) that describes your team.

Tasks

1. List attributes (e.g., creativity, harmony) of your team that were observed during your group exercise.
2. Identify from your list developed above those characteristics that best describe or differentiate your team.
3. Brainstorm for team names or logo ideas that fit your team's distinguishing characteristics.
4. Select and refine your best idea.

Deliverables

- Team reporter presents the team's name or logo including why the team reached this result.

Criteria for Success

- The team's name or logo is descriptive of the team.
- Creativity shown in the name or logo.