Performance Based Learning and Assessment Task

Activity/Task Title

I. ASSESSSMENT TASK OVERVIEW & PURPOSE:
The students will work together in a group to create and conduct a survey, display data, and analyze the results.

II. UNIT AUTHOR:
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III. COURSE:
Algebra, Functions, & Data Analysis

IV. CONTENT STRAND:
Statistics & Data Analysis

V. OBJECTIVES:
AFDA.8 The student will design and conduct an experiment/survey

VI. REFERENCE/RESOURCE MATERIALS:
Class set of Graphing Calculators
Project Instructions/Rubric
Project questions & calculation worksheets
Index Cards
Paper- lined and plain
Graph paper
Colored Pencils
Computer (*One to two days in computer lab)

VII. PRIMARY ASSESSMENT STRATEGIES:
Checklist/rubric Attached for scoring assessment to include survey, data, calculations, analysis and final Project presentation.

VIII. EVALUATION CRITERIA:
Checklist/Rubric Attached.
Benchmarks of expected work attached.

IX. INSTRUCTIONAL TIME:
5 days for Block Schedule/ 8 days for traditional schedule

AFDA Statistics Survey Project

Strand
Data Analysis

Mathematical Objective(s)

- Design and conduct survey
- Recognize Sampling techniques
- Data Collection
- Data analysis and reporting

Related SOL: AFDA.8 The student will design and conduct an experiment/survey

NCTM Standards

- Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them
- Select and use appropriate statistical methods to analyze data
- Communicate mathematical thinking coherently and clearly to peers, teachers, and others

Additional Objectives for Student Learning (include if relevant; may not be math-related):
Prepare final presentation using word processing, Slide show presentation, or Poster. Write up data analysis and report results.

Materials/Resources

Class set of Graphing Calculators
Project Instructions Outline*
Assessment List/Rubric*
Index Cards
Paper- lined and plain
Graph paper
Colored Pencils
Computer (One to two days in computer lab)
**Attached*

Assumption of Prior Knowledge

- Experiment/Survey Design techniques- sampling techniques and bias
- Qualitative and Quantitative Data Qualitative and Quantitative Data
- Central Tendency Statistic Calculations, Normal Distribution, and data analysis interpretation
- Graphing Box and Whisker Plots, Stem and Leaf Plots, Histograms, Frequency Tables

Introduction: Setting Up the Mathematical Task

- Discuss why people create surveys and how they use data to make conclusions.
- **Task**: You are on the High School Improvement Committee. Your committee is discussing the topic of year round schooling. The goal of your committee is to identify pros and cons for the change. Your committee will present their findings, with supporting evidence, to the student council and administration at the end of the semester. Your presentation will include your survey instrument, your survey results including graphs, and your final recommendations.
- Break students into groups of 4-5, and give them the project outline and the teacher will give an overview of the project.
- Students must work together in groups to decide a topic dealing with school improvement to design a survey. The topic must be placed on index card with group member names and turned into teacher. Once complete, the teacher must approve survey questions which must include at least 3 quantitative and 3 qualitative questions. Each group must collect 50 completed surveys. Once data is collected, measures of central tendency and standard deviation data must be calculated. Statistical graphs must be either drawn or completed via computer technology. Then the group must write up their conclusions from their data analysis and create a final project presentation of a paper, power point, or poster. The final presentation includes an oral class component in which each member must participate.
- The teacher will go over the instruction checklist and rubric with the students in detail and ask for any questions before the students are allowed to begin.
- Each group may choose a school appropriate topic to design and conduct a survey having to do with school improvement.
- Groups can be chosen by students or teacher- whichever will allow students to work most efficiently as this is a large project that must be completed in the allotted time.
- The teacher will float around room to make sure students choose topics and create survey by the end of the first class. Data can be collected from students within the class but also must be collected outside of class as well. Students cannot move on with the project until the data has been collected.
- Each portion of the project utilizes prior knowledge from the Data Analysis unit
- The survey topic and survey must be approved by teacher before moving on. The survey itself must include 8-10 questions and must contain at least 3 quantitative and 3 qualitative questions.

Student Exploration

Small Group Work

Whole Class Sharing/Discussion for final project presentation

Student/Teacher Actions:

- The teacher should be monitoring groups for questions, leading questions reminding student of survey design and how to make calculations. The teacher should be prepared to answer and lead students with questions in particular about how to interpret the data and draw conclusions.
- Students will need to have access to graphing calculators to calculate statistical data and computers for typing up data analysis and possibly creating statistical graphs.

Monitoring Student Responses

- Students will:
    - Communicate their knowledge by completing each step of the project;
    - Be respectful of each group member and only communicate within their group on the project requirements;
    - Ask for help from the teacher after everyone in the group decides help is needed;
    - Ask specific questions when needing help

    - The teacher will ask only leading questions in order to get the students to work together as the material is review from the past unit.
    - The teacher will float and make sure that each student in the group is participating and has a responsibility and stays on task.
- How do you plan to summarize your task/activity?
    - The final project presentation will include all parts of the project. There will be time built in for teacher and other groups to ask questions.
    - The teacher should direct questions to specific members of the group to gain individual understanding.

Assessment List and Benchmarks

- Assessment List (attached)
- Group Final Project Presentations
    - Paper, Power Point, or Poster
    - Typed with Title or Cover Page
    - Paragraph Data Analysis
    - Visual Graphs (computer generated or hand drawn)
    - Result Conclusions
    - All group members participate in presentation
- Benchmarks (attached)

AFDA STATISTICS SURVEY PROJECT OUTLINE

Due Date_____

This project will complete our statistics unit and apply many of the topics we have covered. The project will be completed in small groups and include a final project presentation in front of the class. The topics of study must be approved and school appropriate. Everyone in the group must have a part in the final class presentation. The final project must include all work completed including survey, data, calculations, etc. The project must be handed in on-time, be neat, and all group members should be involved.

Problem: You are on the High School Improvement Committee. Your committee is discussing the topic of year round schooling. The goal of your committee is to identify pros and cons for the change. Your committee will present their findings, with supporting evidence, to the student council and administration at the end of the semester. Your presentation will include your survey instrument, your survey results including graphs, and your final recommendations.

Project Outline: **Due Date**

I. Survey Design

- Topic: _____ _____

  Topics are to be agreed upon by the group. The topic must be submitted on an index card that includes all group members' names and include the ability to gather numerical data to be approved by teacher before moving to the next step.

- Survey Questions _____
  - 8-10 question survey
  - At least 3 qualitative and 3 quantitative questions
  - Must have 50 completed surveys per group (some may come from class)
  - Population studying _____
  - Sampling method _____
  - Collection Bias? _____

II. Data Analysis _____

*Must be completed on at least 2 numeric questions **or** 1 interesting question with two sets of data (ex. Boy data vs. Girl data; 9^{th} grade vs. 10^{th} grade)*

- Numeric Analysis
  - Mean, Median, Mode
  - LQ, UQ, Range, IQR
  - Standard Deviation of sample
- Graphic Representations
  - Frequency Table of numeric Questions
  - Histogram

- Box and Whisker Plot
    - Should I compare two groups with this display?

III. Conclusions _____

- Present Results and conclusions
- Sample Questions to consider
    - Describe in words what the data analysis and graphs suggest about survey topic.
    - What can you conclude about your survey topic?
    - Did your survey results give you the result you expected?
    - Did you succeed in the purpose of your survey?
    - Were there any problems with your survey or data collection?
    - Was there any bias in your survey or data collection?
    - What ways you could have improved your survey or sampling method?
    - Things that you learned from completing your project.

IV. Final Presentation _____

The final project presentation can be presented with a paper, power point, or poster, but all members of the group must participate in the class presentation.

- Introduction
    - Include survey topic with purpose statement
    - Include sampling method and target population
- Data Analysis
    - Include survey questions used to make calculations
    - Include major statistical calculations, ex. Mean, median, standard deviation, etc. listed in a paragraph form
    - Include graphs and interpretation of graphs
- Conclusion
    - Write up paragraph from your conclusions of
        - the survey project
        - your data analysis
        - results interpretations
        - what you learned

V. Products to Turn-In

- All work must be turned in on-time and should include topic card, survey, data collected, calculations, write-ups and final presentation.
- Work should be organized and neat
- There should be evidence that All group members contributed

AFDA Survey Project Assessment List

No.	Element	Point Value	Group Assessment	Teacher Assessment
1	Topic and Survey Approved	2		
2	Sampling Method Identified and appropriate	2		
3	Survey has 8-10 Questions	2		
4	Includes 3 qualitative and 3 qualitative questions	2		
5	50 Surveys Completed and turned-in	2		
6	2 sets of Statistics Calculations completed	2		
7	Organized survey results appropriately	2		
8	Appropriate graph was used to represent data	2		
9	Conclusions written in complete sentences	2		
10	Final Presentation includes all group members	2		
11	Group is able to answer questions	2		
12	Package includes all work	2		
13	Package is neat and organized	2		
14	Evidence that all group members participated	2		

AFDA Survey Project Rubric

No.	Element	Point Value Assignments		
		0	**1**	**2**
1	Topic and Survey Approved	Not turned in	Not approved	Approved and turned in
2	Sampling Method Identified and Appropriate	Not identified	Identified but not appropriate	Identified and appropriate
3	Survey has 8-10 Questions	0-4 questions	5-7 questions	8-10 questions
4	Includes 3 qualitative and 3 qualitative questions	Not complete	Missing 3 of each	3 of both types
5	50 Surveys Completed and turned-in	0-10 complete surveys	11-49 complete surveys	50+ completed surveys
6	2 sets of Statistics Calculations completed	No Calculations	1 set of calculations	2 sets of calculations
7	Organized survey results appropriately	No frequency table	Incomplete frequency table	Complete frequency table
8	Appropriate graph was used to represent data	No graphs	1 graph	Both graphs
9	Conclusions written in complete sentences	Not in complete sentences	Some Complete sentences	All complete sentences
10	Final Presentation includes all group members	Does not include all members	Includes most members	Includes all members
11	Group is able to answer questions	Not able to answer questions	Able to answer a few questions	Able to answer most questions
12	Package includes all work	Does not include all work	Missing only a few items	Includes all work
13	Package is neat and organized	Not neat and organized	Somewhat neat and organized	Neat and Organized
14	Evidence that all group members participated	No evidence of group participation	Some evidence of group participation	Evidence of all members participation

Total Point Value _____ / 28 Points Possible

BENCHMARK: (*Sample from a different topic category)*

Topic: UVA vs. VT

Survey Questions:

1. **Are you male or female?**
2. **How old are you?**
3. **What grade are you in?**
4. **Do you like UVA or VT Better?**
5. **On a scale of 1-10 how would you rate UVA in sports? (1 best; 10 worst)**
6. **On a scale of 1-10 how would you rate VT in sports? (1best; 10 worst)**
7. **On a scale of 1-10 how would you rate UVA in academics?**
8. **On a scale of 1-10 how would you rate VT in academics?**
9. **Who has the best mascot, UVA or VT?**

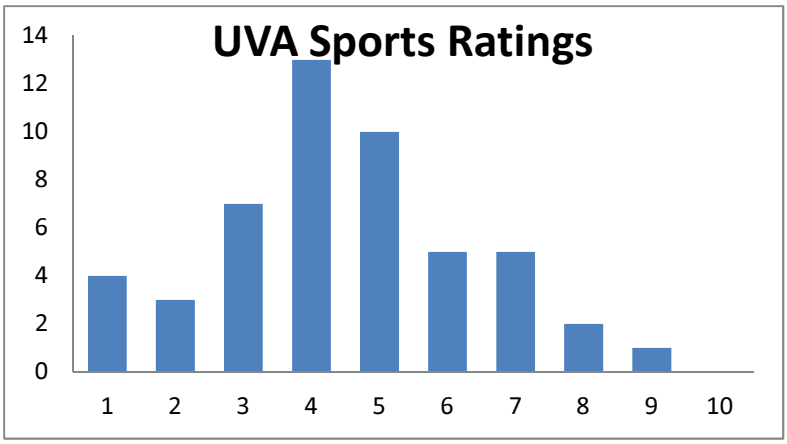
Sampling by convenience on a population of students at FCHS, grades 9-12.

UVA Sports vs VT in Sports: Data Analysis

- Data on UVA
  - UVA Sports Rating
    - Frequency Table

1	2	3	4	5	6	7	8	9	10
4	3	7	13	10	5	5	2	1	0

    - Statistical Measures of Numeric Data on UVA Sports
      - Mean=4.46, Median=4, Mode=4
      - LQ=3, UQ=5.75, Range=8, IQR=2.75
      - Standard Deviation of sample=1.9
    - Histogram

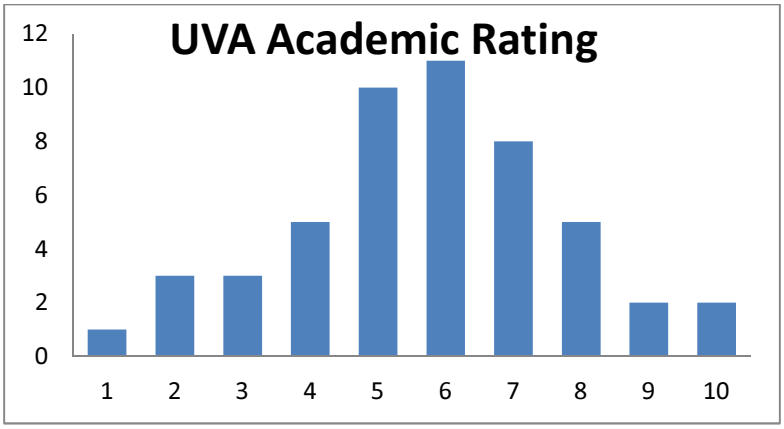


- UVA Academics Rating
  - Frequency Chart

1	2	3	4	5	6	7	8	9	10
1	3	3	5	10	11	8	5	2	2

  - Statistical Measures of Numeric Data on UVA Academics
    - Mean=5.72, Median=6, Mode=6
    - LQ=5, UQ=7, Range=9, IQR=2
    - Standard Deviation of sample=2.0

  - Histogram

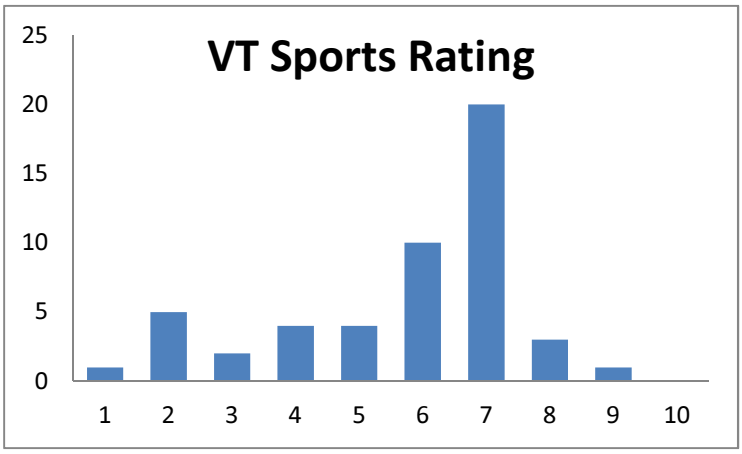


- Data on VT
  - VT Sports Rating
    - Frequency Chart

1	2	3	4	5	6	7	8	9	10
1	5	2	4	4	10	20	3	1	0

    - Statistical Measures of Numeric Data on VT Sports
      - Mean=5.72, Median=6, Mode=7
      - LQ=5, UQ=7, Range=8, IQR=2
      - Standard Deviation of sample=1.9

- Histogram

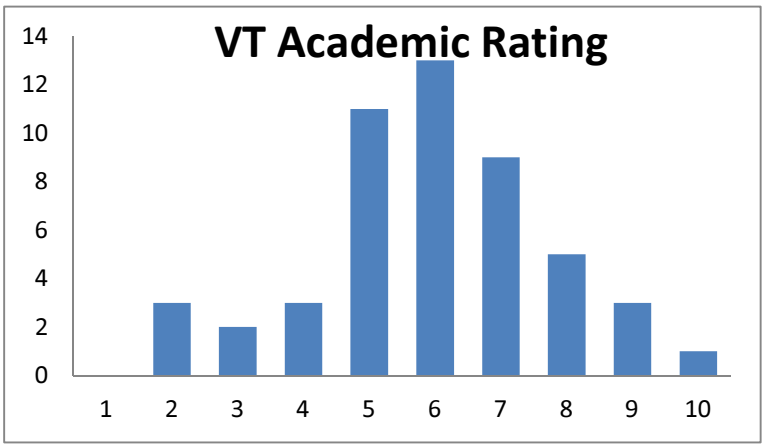


- VT Academics Rating
  - Frequency Chart

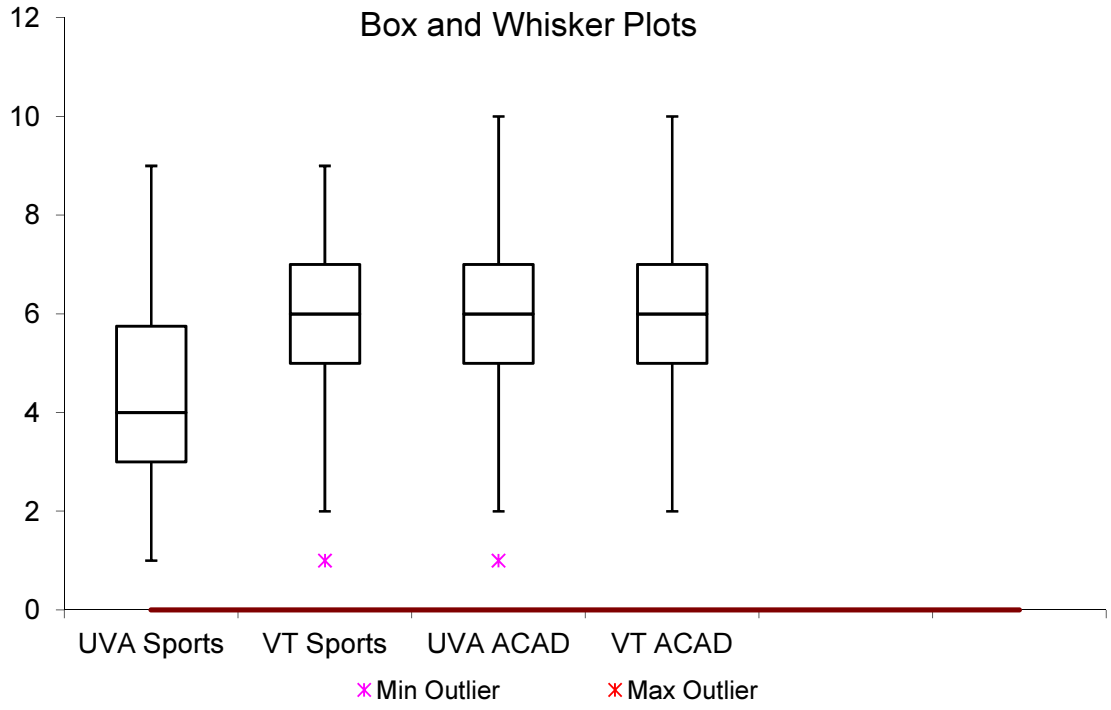
1	2	3	4	5	6	7	8	9	10
0	3	2	3	11	13	9	5	3	1

  - Statistical Measures of Numeric Data on VT Academics
    - Mean=5.94, Median=6, Mode=6
    - LQ=5, UQ=7, Range=8, IQR=2
    - Standard Deviation of sample=1.8

  - Histogram



- **Comparison of UVA vs. VT**



Conclusion

When looking at the data, we can conclude that FCHS students in grades 9-12, hold UVA and VT academics on an equal status. Both of the academic programs seem to be approximately normally distributed based on the histogram and have the same median rating of 6 and the same distribution about the quartiles; however, UVA academics rating has 1 lower outlier.

The data comparing UVA and VT sports is quite different. The data suggests that FCHS high school students rate VT sports higher than UVA sports. The median rating score for VT sports is 6 while the median UVA sports rating is 4. The mean rating scores also differ by 1.48 favoring VT sports. Looking at the histograms, both data sets seemed to be skewed. Due to this, there may be some bias affecting the data.

In conclusion, UVA and VT are rated similarly in academics but VT is rated more favorably in sports. This was not my expected result. I thought that UVA would be rated higher in academics and VT rated higher in sports. Some of the areas to improve my results would be to have conducted a more random selection of survey participants, and I could have asked more people.