Title of Lesson: Lesson 1 Descriptive Statistics Subject : Applied Statistics LESSON PLAN 1 Name: Dadan Rosana Title of lesson: **Descriptive Statistics** Date of lesson: 2012 **Length of lesson:** 2 x 50 minutes **Description of the class** Name of course: **Physics Education** Grade level: Source of the lesson: Welkowitz, Joan, Robert B. Ewen, and Jacob Cohen. Introductory Statistics for the Behavioral Sciences. Third edition. San Diego, CA: Harcourt Brace Jovganovich Publishers, 1982 Kuehl, Rober O. Statistical Principles of Research Design and Analysis. Belmont, CA: Duxbury Press, 1994 Peck, Roxy, Chris Olsen, and Jay Devore. Introduction to Statistics and Data Analysis. Pacific Grove, CA: Duxbury, 2001 **Duration: 2x50 minutes Lesson aims:** Learners to understand and use Descriptive Statistics.

Assessment method(s):

• Group activities

Functional Skills: Applied Statistics Sample Lesson Plan: Descriptive statistics

Specific learning outcomes:

Students will be able to:

Title of Lesson: Lesson 1 Descriptive Statistics

Subject : Applied Statistics

Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

- Question & Answer during the session..
- Learner engagement during session.
- Worksheet

Linked Functional Skills:

Speaking, listening and communicating:

Students participate in discussions during the session, how they articulate answers and communicate with other learners.

Previous knowledge assumed:

Understand and use positive and negative numbers of any size in practical contexts.

Carry out calculations with numbers of any size in practical contexts.

Extract and interpret information

Materials and equipment required:

Powerpoint.

Worksheet

Time/ Stage	Subject Matter/Content	Teacher Activity	Student Activity	Resources/ Notes
5 min	Introductory Activity: What chance of being right?	Have students use the KWL chart as a Think-Pair-Share. Have students consider and fill in what they learned as individuals first, discuss their successes and questions with a partner, and then share what they have learned as a group. Have students share things that they learned as well as questions they still have.	Discussions and agreement. Identify chance of being right.	This activity is designed to introduce probability in terms of the word 'chance'.
10 min	Explanation and discussion.	Distribute the KWL chart regarding descriptive statistics and have students complete what they already know and what they want to know individually.	Ask questions.	Chance is something most people use their instinct to decide. This activity and explanation is to establish that mathematics can be used to assess chance (i.e. probability).

Time/ Stage	Subject Matter/Content	Teacher Activity	Student Activity	Resources/ Notes
10 min	Small Group Activity:	Students should be able to discuss the effects of outliers on the measures of center and what that would look like on a graph of the data. Students should be able to discuss the effects of extreme values on the decision-making process in the context of a problem. Students should be able to explain how measures of spread might affect their decision-making process within the context of a set of data. Students should be able to organize multiple sets of data for comparison and articulate similarities and differences.	Ask Questions Discussions and agreements. Feedback comments and questions.	At the first selection, the probability will be the same for each group, but this will change as the selection process continues.
5 -10 min	Explanation and discussion.	At the first selection the probability will be the same for each group. This will change as the selection process continues.	Ask Questions.	
25 min	Worksheet	1. Group students and distribute a set of the test data per group. Have students organize the data visually on chart paper and display them in the front of the room. As a class, discuss which class performed the best, based on the visual representations	Complete worksheet.	

Time/ Stage	Subject Matter/Content		Teacher Activity	Student Activity	Resources/ Notes
			alone and have students justify		
			their reasoning. For instance, a		
			student might explain that 6 th		
			period is the strongest because		
			they have the highest score or		
			that 5 th period is the most		
			consistent because they have the		
			smallest spread. Differences in		
			scale and choice of		
			representation may affect the		
			appearance of the data.		
			Encourage students to look		
			closely and discuss the		
			differences and how the		
			representations may mislead the		
			viewer.		
		2.	Give each group calculators,		
			chart paper, and all three sets of		
			data to organize and compare.		
			Groups may choose to compare		
			their data by any means they find		
			most useful. Have students		
			calculate the measures of center		
			and spread in order to help the		
			comparison. Groups should		
			discuss which class they feel is		
			the strongest as a group, as well		
			as which class they would prefer		
			to be in if they did not yet know		

Time/ Stage	Subject Matter/Content	Teacher Activity	Student Activity	Resources/ Notes
		their individual test score. These		
		answers may not be the same for		
		all students within the group, and		
		they may not be the same for		
		both questions. For example,		
		students may feel as though 3 rd		
		period is the strongest because		
		they have the highest median,		
		but they may want their score to		
		come from 5 th period to avoid		
		the low outlier in 3 rd period.		
		Have students share and justify		
		their solutions with their group		
		using the measures of center		
		(mean and median) and spread		
		(inter-quartile range, range, and		
		standard deviation).		
		3. Have each group present		
		should present their findings, using		
		graphical displays and descriptive		
		statistics for support. Have them		
		construct arguments for and against		
		the decisions of other, while		
		listening to and valuing all		
		arguments. Encourage students to		
		use appropriate vocabulary when		
		discussing the data and should be		
		encouraged to articulate patterns that		
		they see. For instance, students may		

Time/ Stage	Subject Matter/Content	Teacher Activity	Student Activity	Resources/ Notes
		notice that extreme points have an		
		effect on the mean but not the		
		median and they, therefore, may not		
		want to use the mean to support their argument.		
		Have students examine and organize		
		the City Data and organize it in		
		order to decide where they would		
		prefer to live. Encourage students to		
		provide sound mathematical		
		justification for their decision. Have		
		students who prefer City #1 move to		
		the left side of the room and students		
		who prefer City #2 move to the right		
		side of the room. Have groups share		
		the reasons they chose their city,		
		based on the graphical		
		representation and measures of		
		center and spread. If students use		
		the actual numerical data to explain		
		their decision, encourage them to		
		articulate what they believe a given		
		representation might look like based		
		on their explanation. Conversely, a		
		student that only used visual		
		representations in his or her		
		arguments should be encouraged to		
		estimate measures of center or		
		spread. A possible explanation for		

Time/ Stage	Subject Matter/Content	Teacher Activity	Student Activity	Resources/ Notes
		City #1 might be that a student would prefer living in a place with a large range of temperatures in order to be able to experience all four seasons. Students should notice that the mean and median temperatures are similar for both cities, but that the spread of the data drastically affects their decision.		
10 min	Worksheet Answers	Provide answers and give explanations where necessary. Ask questions and discuss the checking procedures.	Ask Questions	• Are students using the appropriate vocabulary when describing the center and spread of the
5 min	Conclusion	Guide them to common sense checking.	Ask Questions.	distributions? Can students easily explain a decision based on a graphical display of data and the corresponding descriptive statistics? Can students identify and compare approximate measures of center and spread from a graphical display of data?

Title of Lesson: Lesson 1 Probability
Subject: Applied Statistics
Number Cards: Probability

1	2	3	4
5	<u>6</u>	7	8

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Task 1

A charity group decided to hold a summer fair to raise money. Two possible Saturdays, one in May and the other in July were considered by the charity organisers. They wanted the fair to have the best chance of being on a sunny. One of the organisers did some research and collected data on the weather for these two Saturdays over the past 8 years.

	2003	2004	2005	2006	2007	2008	2009	2010
May	Cloudy	Sunny	Cloudy	Rainy	Sunny	Sunny	Cloudy	Sunny
Saturday								
July	Rainy	Rainy	Sunny	Sunny	Cloudy	Sunny	Cloudy	Rainy
Saturday	-							

your workings.	nate which Saturda	ly has the best ch	nance of being sunn	ıy ın 2011. Snow

Title of Lesson: Lesson 1 Probability Subject: Applied Statistics

Task 2

A student was raising money for charity by taking part in a 10km cross-country run. One of the sponsors for his run offered two options:

- 1. £150 if the run was completed in less than 30 minutes.
- 2. £10 per kilometre

To help decide which option to choose the students examined his timings for cross-country runs completed over the previous three weeks. In each week he had completed two cross-country runs.

Use this data to assess the probability of the student completing the charity 10km cross-

Week/run	Distance (km)	Time Min: sec
Week 1 Run1	10	29: 24
Week 1 Run2	10	31: 45
Week 2 Run1	12	35:30
Week 2 Run2	9	30.20
Week 3 Run1	10	28: 50
Week 3 Run2	9	26.45

country run in less than	country run in less than 30 minutes.					

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Task 3

The high street bank has introduced a new system to deal with appointments. The expected waiting time would be less than 6 minutes.

In the first week of the new system people attending appointments were asked to complete a survey which included a question on how long they had waited for their appointment. The table below shows how long these people waited.

	Survey								
Appointments (number of minutes waited)									
1	0	1	9	0	5	0	7	1	0
2	5	0	1	3	8	0	6	3	1
5	2	0	0	7	0	3	4	3	2

The centre manager wants to follow up the survey with interviews, and will select at random one of the people who filled in the survey. Show the chance of the person selected being someone who had waited 6 minutes or more.

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Task 4

At a restaurant customers are asked to complete a survey when they leave. Every month there is a prize draw for customers who complete the survey and include their

Every monun there is a prize draw	for customers	wno compiete	me survey	and includ
contact details.				

	Survey results for last month													
Ratings 5 = Very Go	ood 4 :	= Go	od 3 =	= Sati	sfacto	ory 2	= Poo	or 1 =	- Ver	y Poor				
Survey Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Customer rating of restaurant	5	4	5	3	4	2	5	3	2	4	5	5	3	4
Contact details included in survey	/		/	/		<u> </u>	/	<u> </u>		<u> </u>			<u> </u>	/

Peter completed Survey 1	Number 10. Wha	it is the chance	of Peter getting	the prize? Justify						
your decision.										

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Task 5

A student was starting a college course and had to travel to the college by train. The train timetable had a train at 8.10 which arrived at the station by the college just before the first lesson began.

The student looked on the train company's website to see if the trains were always on time. The information stated:

"Our trains are on time for 87.5% of journeys. We apologise for the others, which are late, often due to factors outside our control."

What is the chance of the student being late for lesson on the first day of the course? State hance as 1 in Show your workings.							