

Learning Design for: Descriptive Statistics (Math's)

Context

Topic: Air Quality Box and whisker plot

Total learning time: 3 hours and 30 minutes

Designed learning time: 3 hours and 30 minutes.

Size of class: 25

Description:

This activity is designed for over 18 years old students attending health technical and vocational courses. It is post-compulsory education. A "box and whisker plot", also called "boxplot" is a standardized way of displaying the distribution of data set. It is useful to compare data sets of quantitative variables as Inhalable particulate matter (IPM) ($<10\mu\text{m}$), Ozone (ppb) and CO, Carbon monoxide (ppb) directly related to human health and the location where we live. It is often used in explanatory data analysis and shows the shape of the distribution, its central value, and its variability.

The lesson is a climate research in which, students will use a free app called BreezoMeter and will gather information daily about IPM in two areas of their region for two months. The areas are previously selected by teacher (area 1: industrial area or city where they live; area 2: mountainous area in their region or country). The information will be saved in an Excel spreadsheet and boxplot will be created to compare results and start a debate in the group. Sources and effects of IPM, Ozone and CO on health.

Mode of delivery: Classroom-based

Aims

To encourage students to research and critically think while attend lessons To motivate students to analyse data sets related to air quality and health from their own region.

To develop a critical understanding of the information that a boxplot displays relevant to Inhalable particulate matter (IPM) ($<10\mu\text{m}$), Ozone (ppb) and CO (ppb).

To define and describe Inhalable particulate matter (IPM) ($<10\mu\text{m}$), Ozone and CO and their influence on health.

To foster students to gather data set and share results using IT tools (excel spreadsheet and virtual dashboard)

To increase students' confidence in their research and debate skills

To encourage students to take risks and learn from their mistakes.

Outcomes

Knowledge: To specify the 5-number summary of a boxplot: Minimum (Q1), (Q2), (Q3) and maximum.

Measure (Knowledge): To measure IPM, Ozone and CO using the app BreezoMeter.

Identify (Comprehension): Parameters with their boxplot.

Define (Knowledge): To define statistics for medical sciences, especially descriptive Statistics, and quantitative variables.

Specify (Knowledge): To describe box and whisker plot and its information.

Select (Comprehension): To select information about IPM from the BreezoMeter app daily and gather data in an Excel spreadsheet.

Explain (Comprehension): the equivalence between Quartiles, Percentiles, and central tendency measures (median, average)

Calculate (Application): Central tendency measures, Quartiles and Percentiles.

Produce (Application): Box and whisker plot in Excel and upload it in a virtual dashboard (Padlet)

List component parts of (Analysis): Box and whisker plot

Design (Synthesis): Infographics (with IT tool as genially or Canva) to present results, discussion, and conclusion.

Defend (Evaluation): The results of the research in a debate.

Justify (Evaluation): Student's position in a debate (pros and cons of living in different area related to air quality)

Teaching-Learning activities

Air quality impacts our health.

<i>Read Watch Listen</i>	<i>30 minutes</i>	<i>24 students</i>	<i>Tutor is available</i>	<i>Online</i>
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Teacher asks students background knowledge about climate change and health.

The driving question could be:

Do you know how the air quality influences or impacts our health?

After this driving question:

Teacher gives links where research (online WHO page (link_1)) and Breezometer web page (link_2). <https://www.breezometer.com/air-quality-map/>

Linked resources.

Climate change and health

Climate change video

Notes

Maybe is better to watch first the video to motivate students to read and research on the internet about climate change and health.

Researching and analyzing the air we breath

<i>Investigate</i>	<i>30 minutes</i>	<i>24 students</i>	<i>Tutor is available</i>	<i>F2F</i>
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<https://breezometer.com/air-quality-map> (link_1)

Teacher explains the easy and free IT tool named BreezoMeter and how to write the name of their city and save the information about IPM, Ozone and CO levels.

Linked resources.

<https://www.google.es/intl/es/docs/about/> to share the project draft and process suggestions.

<https://www.google.es/intl/es/forms/about/> To create a form in which the questionnaire of the carbon footprint is saved in order to can be studied in detail, create, and display the information in graphs.

<https://www.google.es/intl/es/sheets/about/> Google spreadsheet to gather air pollutants.

<https://www.euro.who.int/en/health-topics/environment-and-health/Climate-change> Video related to climate change and health.

<https://www.pbs.org/wnet/peril-and-promise/2019/01/economics-climate-change/> Video Related to climate change and economy.

<https://toogoodtogo.org/en/movement/knowledge/the-carbon-footprintideo> Webpage with a video related to our carbon footprint.

<https://padlet.com/> Virtual dashboard as Padlet, to introduce themselves to the rest of the partners or to share research, results and posters related to Educational Environmental Day

https://www.canva.com/en_gb/login/ Canva, to display information of the results and eco-friendly tips.

Piktochart <https://piktochart.com/> to display information of the results and eco-friendly tips

<https://breezometer.com/air-quality-map> Breezometer to control the air quality.

<https://footprint.wwf.org.uk/#/> to calculate the carbon footprint (how big our environmental footprint is) in tones of CO₂.

<https://www.menti.com/> Mentimeter to choose some project products or gather thoughts related to climate change as a brainstorming activity

<https://en.calameo.com/> Calameo to convert the text file of the project summary into a digital e-book.

<https://www.genially/en> Genially to display the results

<https://ec.europa.eu/eurostat/data/database> Data base to select graphs and more information about economy and climate change.

<https://www.cdc.gov/climateandhealth/effects/default.htm>

Answergarden <https://answergarden.ch/> to share thoughts and reflections in different parts of the lesson (one Answergarden for each sharing activity)

Powerpoint to disseminate students' research in a congress

Show my current air quality

<i>Practice</i>	<i>30 minutes</i>	<i>24 students</i>	<i>Tutor is available</i>	<i>F2F</i>
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Students will gather and save data in Excel and displays information on a boxplot.

Students copy the box and whisker plot, paste it on a word or save it as an image.

<i>Produce</i>	<i>30 minutes</i>	<i>24 students</i>	<i>Tutor is available</i>	<i>F2F</i>
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Students practice with one of the IT tools:

Canva or Genially.

The groups will create an infographic where boxplot, result and discussion will be included and clarified.

Each group collects data of their parameter and zone.

After collecting data, students will create infographics with their results.

Teacher print students' boxplot to share them in a physical wall.

Air quality detectives' debate

<i>Collaborate</i>	<i>40 minutes</i>	<i>24 students</i>	<i>Tutor is available</i>	<i>F2F</i>
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Each group has its spokesperson who collects data set, boxplot and digital products created by their team about air quality parameter in a specific zone.

Teacher foster spokespersons to meet and share information to get that all the groups have all data set.

The spokespersons will take pictures of their teammates while researching, analyzing, and creating information.

<i>Collaborate</i>	<i>30 minutes</i>	<i>24 students</i>	<i>Tutor is available</i>	<i>F2F</i>
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Each group will analyze all the results in infographics and paper posters where boxplot, resources, and effects of all the parameter are included.

They will prepare arguments to explain the parameters levels depending on the area where have been obtained.

<i>Discuss</i>	<i>20 minutes</i>	<i>24 students</i>	<i>Tutor is available</i>	<i>F2F</i>
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In two big groups, a debate will be celebrated in which different arguments about air quality in mountainous and industrial or urban areas are exposed and debated.

Learning digital and paper products are shared in a physical and in a virtual dashboard.

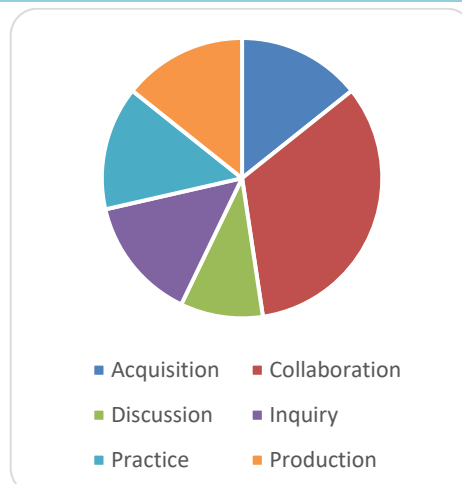
Notes

After the spokespersons meeting, all groups will have all the information about air quality research, not only the printed infographics but also the digital products:

1_Excel spreadsheet

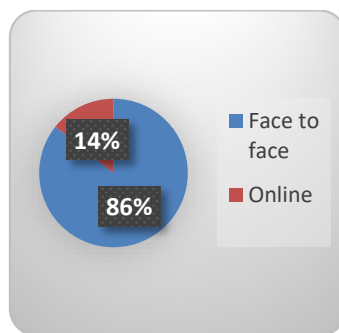
2_Infographics with box plot and result discussion

Representations of the learning experience

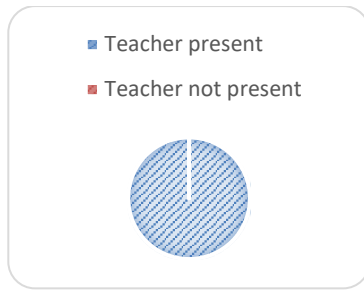


Learning through	Minutes	%
Acquisition (Read, Watch, Listen)	30	14
Investigation	30	14
Discussion	20	10
Practice	30	14
Collaboration	70	33
Production	30	14

	Minutes	%
Whole class	0	0
Group	210	100
Individual	0	0



	Minutes	%
Face to face	180	86
Online	30	14



	Minutes	%
Teacher present	210	100
Teacher not present	0	0