

Goal-directed Instructional Design Plan - Using Visual Statistical Representations

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1. **A problem or a need** – Students need to be able to interpret and use graphical/visual representations of statistical measure
2. **A real-world performance** – We live in a world in which data is easy to come by for which it is essential that we are able to use it to tell a story about the information. For example there is data available about the levels of mercury in tuna. Students could be asked to make a recommendation for pregnant women, for which elevated mercury levels pose potential harm to the fetus.
3. **An instructional objective** – the objectives are based on the final outcome, activity or test. These objectives will each be different for the four types of knowledge; *performing skills, recalling facts, identifying examples of concepts, and applying principles.*
 - a. *Recognize that there are varying ways of representing univariate data.*
 - b. *Choose and use an appropriate visual representation for the data.*
 - c. *Analyze the strengths and weaknesses of various representations of univariate data.(part of choosing a representation)*
4. **A set of essential content** – Students need to analyze and use visual representations of univariate statistics including dot plots, stem and leaf plots, histograms and box plots.
5. **An evaluation consisting of a test or observation** – when faced with a set of data involving a context students will be able to evaluate the data and present it with an appropriate visual representation that helps to reinforce the stance they have taken. (may be done in many forms, quiz, classwork, test or exam question, ...)

6. **A method to help participants learn** – After a brief introduction students to the types of visual representations of data assign students to groups of 3-4 and assign them a visual representation to research online. Include instructions that the students are to do the following:

1. Determine how the visual representation is constructed and give explicit instructions for how to produce it from a set of data.
2. Explore and explain what benefits the display has.
3. Explore and explain what the pitfalls of the display are.
4. Give an example of when using the display would be useful, explain why it is useful and use it to give support to a stance taken with regard to a set of data.

Once students have completed the initial research on the assigned topic they will need to present their findings on a class wiki page. A wiki page will need to be created for each class so that students can join and post their information to it. It is up to the instructor to determine how to set up the site. i.e. whether or not to create pages for each group or to let the students negotiate the set up. As an additional goal the teacher may choose to set up the project so there is more than one group assigned to a topic and students will be required to use the wiki to negotiate what and how the information is displayed. Instruct students to post their information to their respective wiki page as determined by the set up.

After students have completed the wiki site they will need to explore other groups representations and complete a worksheet where they are asked to construct each of the representations for a given set of data and compare and contrast the representations usefulness in justifying points of view.

The final product will be a quiz in which the students are given two sets of data and need to justify their own stance about a set of data.

- **Motivation:**

- Meaningfulness – There are two portions of this lesson that provide meaningfulness. First the students are required to collaborate in and produce a document which will be used by others in the class to gain knowledge about a particular topic. Secondly, the students will be able to analyze data and present it in a format of their choosing to prove a stance they have taken. Choice is important to making the lesson meaningful. Also important, is that the data that they are given to analyze is real and the consequences of what they choose is seen as having value.
- Pleasant consequences – The ability to use a visual representation that aids in students ability to argue or demonstrate an important point.
- Novelty – Students will produce a product that may be made visible to the whole world. For many of my students their only experience with submitting work has been directly to their teacher. The idea that they are submitting work to the world, not just me has the potential to be hugely motivating.

- **Socialization** - This lesson contains several elements that are social in nature. Group work provides students with a chance to talk through their ideas with each other and build upon the knowledge of their peers. Using A wiki allows them to collaborate with each other in an environment that has some novelty. If presented correctly the idea that the wiki page could be made public for all of their peers or to the whole world for that matter also provides another element of socialization.

- **Audience** – For what audience are you designing this lesson? Consider the following:
 - Age: 16-17

 - Skill level: Any

 - Prerequisite knowledge: students should have experience in accessing information from the internet. It will be essential that proper citation of sources is discussed before students embark on their research. Students will also need some understanding of the general tools and features of a wiki creation site such as wikispaces or the like.

- **Technology Needs** – Students must have access to the internet during both their research phase and the wiki construction phase. This could take many forms and combinations of lab/class time and work expected to be completed outside of school hours. The balance would be adjusted as necessary and as dictated by the students skill level.