Understanding by Design(Backward Design) Lesson Plan : Analyzing Cancer Data

Stage 1 Desired Results

ESTABLISHED GOALS Students will use the cbioportal.org site to analyze cancer data accumulated through different types of studies.	*Transfer*	
	Students will be able to independently use their learning to…	
	Analyze data to construct meaning behind real life cancer data.	
	Meaning	
	UNDERSTANDINGS *Students will understand that…* Several studies have been conducted to analyze all aspects of cancer. This data can be used to make predictions and inferences about the cause of the cancer.	ESSENTIAL QUESTIONS How can accrued data help make decisions about future treatments in cancer? What does real-time data look like and how can it be analyzed?
	Acquisition	
	Students will know… There are several analytical studies conducted on cancer and can be used to inform future decisions.	*Students will be skilled at…* Reading several different types of graphs and understanding their importance and analyze them.

Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
	PERFORMANCE TASK(S): **Description:** In the following project, you will choose a type of cancer and research it through computational-biology skills through cbioportal.org. This is an individual project and requires independent research of skills and topics not discussed in class. Both posters and slideshows will be acceptable. How to use the website: 1. Click on the website, once it has loaded you should see a list of different cancer studies. 2. If you look to the left you will see that there are different classifications of cancer studies, scroll through and click on the study of your choice 3. Once you click on at study, click "Explore Selected Studies"

	4. On the page you will see multiple different graphs and boxes, look for a chart that says cancer type and select one.
	
	    a. If you cannot find a cancer type box that means that you selected a study that focuses on only one type of cancer, to view the cancer type go back to the homepage, the cancer type is in blue above your selected study.
	
	5. If necessary, select a box from the "Cancer-Type Detailed" chart.
	
	    a. This is only found in large clinical sequences
	    b. If applicable, make sure to mention the frequency of the cancer type in the project
	
	6. Select a tumor site of your choice
	
	    a. Make note of the frequency
	
	7. Now use the models/graphs provided to explore your topic
	
	    a. If you need help, the website contains a Tutorial section on their homepage
	    b. Many of the models may look different than what you're used to, research them! Many of these models contain important information that is applicable in this field
	
	Requirements:
	
	• Research a cancer study of your choice. Make sure to cite the study that you are getting your information from.
	• Determine the classification of the cancer study (ex: kidney, bone, etc.) and describe why this type of study is important
	• Select a primary tumor site for that cancer and describe why that site might be important
	• Include 6 models/visualizations from the site
	• Must include 3 new types of models that we have not reviewed before in this class (KM plots, metastatic diagnosis, etc.)
	    • Research these modules and explain how to interpret them and why they are important to oncology (the study of cancer)
	• Site all your work in APA format

Rubric:

Criteria	4	3	2	1
Requirements	Requirements were met and exceeded. All sources were cited in APA and modules used are cited on the same page	Requirements were met and citations appropriately provided	One part of a requirement was not met but citations are appropriately provided	An entire requirement was not met or citations were not appropriately provided.
Statistics	All graphs are appropriately represented and frequencies indicated when appropriate	One graph may be mislabeled or one of the frequencies are missing	Multiple graphs and frequencies are not appropriately labeled	Graphs and frequencies are not accommodated for
Independence	Student is able to interpret and describe various types of modules & graphs without needing assistance	Student is missing elements in their description but is able to do the assignment independently	Student requires some help from teacher	Student is not able to successfully do independent research to interpret new and unfamiliar material
Design	Slideshow/Poster is creative: it is clear that time was put into the poster, at least two of the visuals is the student's own work	The project is creatively designed, only one of the visuals is the student's own work	Less effort went into the presentation or none of the visuals is the student's work	The project was hastily made and disorganized.

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

Students will be learning about the cell cycle and control of the cell cycle. Proto oncogenes and tumor suppressor genes will be discussed. Students will be asked to complete this computational biology assignment to learn how to read the data presented on this website. This provides the foundation for future research project as students will need to use the website and skills acquired to be success at their next assignment.