

## Report for the Grant for Excellence in Teaching and Learning

### Anatomy and Physiology I and II Equipment and Software Grant

Awarded in Spring 2022

#### Grant Application Overview

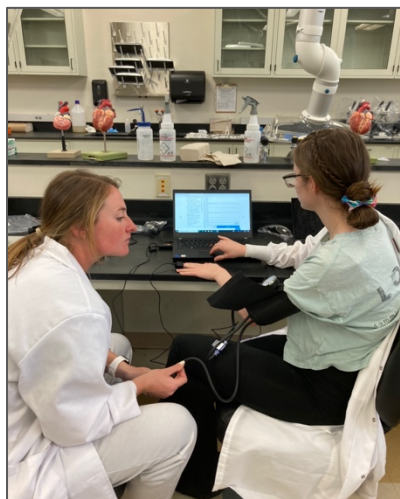
The aim of the application for the “Grant for Excellence in Teaching and Learning” submitted to the Teaching and Learning Center (TLC) in Spring 2022 was to seek funding to acquire hardware (USB sensors and transducers) to be used with the digital lab manual (KuraCloud) to implement a blended laboratory model for A&P I and II labs. For the purpose of the proposal, a blended pedagogical model is defined as a *student-centered* model, where direct instruction is combined with *interactive digital guided work*. The choice of this pedagogical model was based on the idea that learning physiological processes is facilitated by live physiological data collection and analysis on the KuraCloud platform (Lt, ADInstruments). Moreover, while the KuraCloud platform allows students to collect physiological data on their own bodies, all experiments can also be demonstrated using simulated data. This is a great teaching tool both in class and at home; in fact, students who are unable to attend a lab in person due to illness can still complete most of the lab work from home using simulated physiological data. Most importantly, the KuraCloud platform is designed to improve student engagement in lab by requiring *active collection of data*, and by prompting *reflective learning* with pre-formulated (albeit editable) questions after the data analysis.

#### Implementation of Grant Funds

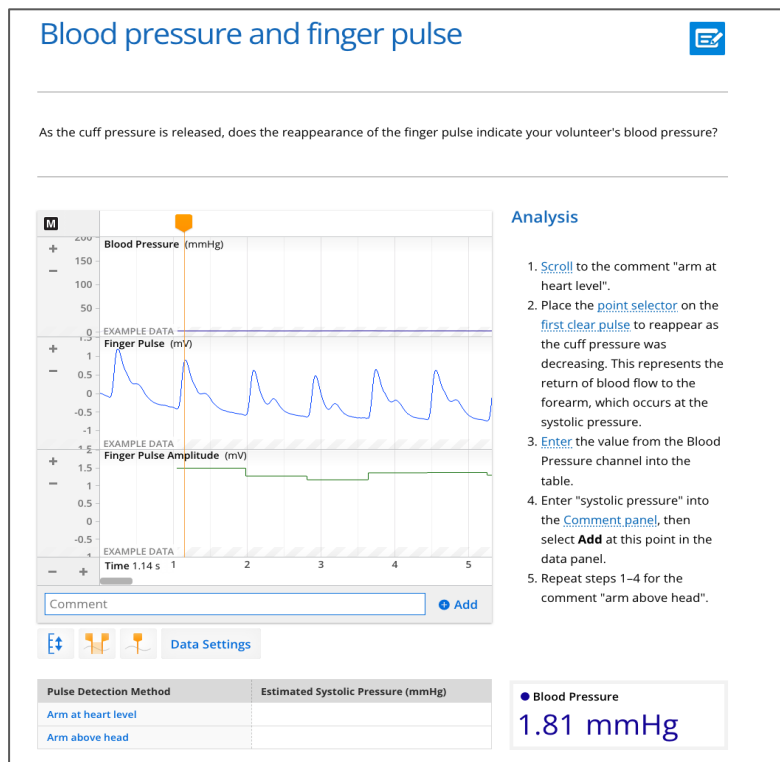
With the assistance of the TLC office, we purchased all hardware (computers and sensors) in the Summer of 2022, and the computers arrived early Fall 2022. I dedicated a minimum of 40 hours to select and build the modules during Fall 2022, in preparation for the launching of this system in my Spring 2023 APII labs. During Fall 2022, I have also worked closely with the Textbook office to create a custom order for the digital manual, and with the Canvas Administrator (Mr. Carson Young) to ensure that KuraCloud integrated smoothly with Canvas. This required multiple meetings with the KuraCloud Development (which resides in New Zealand) and the KuraCloud Support Teams. We were able to successfully troubleshoot a few minor obstacles and have developed the integration pipeline for future users. Moreover, I have worked with the UNCP Information Technology Department to get KuraCloud approved and installed on the purchased laptops. This approval will also apply to all future users.

## Piloting KuraCloud

In Spring 2023, all four sections of my AP II labs used KuraCloud as the primary digital laboratory manual and platform for physiological data collection and storage. In general, students liked the platform, as shown by the survey responses (shown below). The feature that students liked the most was the ability to work through the material in an interactive way in both pre-lab and in-lab exercises. More specifically, I have chosen KuraCloud modules that include various types of exercises that guide students through direct data collection (Figure 1) and analysis (Figure 2). For example, students can visualize otherwise abstract and complex physiological principles like the relationship between blood pressure and heart rate (Figure 2).



**Figure 1.** AP II Students engaging in a KuraCloud-based activity involving human data collection and subsequent analysis.



**Figure 2.** Guided analysis of blood pressure and finger pulse data collection (Figure 1) on the KuraCloud Blood Pressure module.

Moreover, the KuraCloud modules I have chosen and customized, offer a range of interactive exercises that do not require physiological data collection (Figures 3 and 4). Many of these exercises are incorporated in a pre-laboratory module, with the idea that students come to lab with a general understanding of structures and their functions. I have assigned a point value to most questions, such that students can be rewarded for their work, thus positively contributing to their overall lab grade. For pre-lab and in-lab exercises, I often allow for multiple attempts, such that repetition can reinforce knowledge. The KuraCloud modules also have exercises that invite students to think about anatomical or physiological concepts, and to **synthesize** the information they learned in the module or in lab. The information students type in the summary tables (Figure 4) or text boxes (Figure 5) is graded at the end of each week.

**External stomach**

The position and size of the stomach varies between people, but when empty it is about the size of a clenched fist. It is generally positioned in the upper left quadrant of the abdominal cavity, anterior to the left kidney and spleen. The stomach can be divided into four main areas: cardia, fundus, body, and pylorus.

Label the structures of the external stomach. 8 pts

Body

Cardia

Duodenum

Esophagus

Fundus

Greater curvature

Lesser curvature

Pylorus

Check Answer

Figure 3. Example of interactive (drag and drop) KuraCloud exercise to help students identify anatomical structures.

**Structure identification**

- Identify the individual structures using the models provided.
- Describe the function of the structure.
- Describe how you will recognize the structure (its location relative to other structures).

**Large intestine, rectum, and anal canal** 10 pts

Structure	Function	How will you recognize this structure?
Cecum	Absorption and production of feces	The cecum is a blind pouch considered to be the beginning of the large intestine and hangs inferior to the ileocecal sphincter.
Appendix		
Ascending colon		
Transverse colon		
Descending colon		
Sigmoid colon		
Rectum		
Anus		

Check Answer

Figure 4. Example KuraCloud exercise that invites students to reflect and synthesize the function of organs and their anatomical characteristics.

**Check your understanding**

From your finger pulse recording, is there any way to determine diastolic pressure? Could a finger pulse measurement ever replace the stethoscope in determining diastolic pressure? 3 pts


Enter your answer here

**B** *I*  $x_2$   $x^2$

Check Answer

Figure 3. Example of text box question for the Blood Pressure module. The question invites students to reflect and synthesize information learned in class.

Additionally, I have included KuraCloud modules for **guided dissection of organs**, which include short videos that students can watch while they execute the organ dissection in lab (Figure 6). The dissections are followed by “Test your learning” activities to reinforce the concepts learned during the organ dissection lab (Figure 7). In APII labs I have included the dissection of dissect heart, lungs, and kidneys.



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**Structure checklist**

Indicate whether these structures were identified while following along with the video. If a structure was not identified, think about where it should be. Use Connect Anatomy and Physiology Revealed (APR) Cadaver Dissection Tool if you need assistance.

Structure	Identified (Yes/No)	How will I remember this structure?
Fibrous pericardium		
Parietal pericardium		Middle layer of pericardium, with a smooth surface.
Visceral pericardium	Not visible to the naked eye	
Pericardial cavity		

**Figure 4.** Video illustrating dissection of heart followed by a fill in the blanks structure checklist.

**Test your learning**

Label external features of the anterior view of the human heart.

Anterior inter-ventricular artery

Aorta

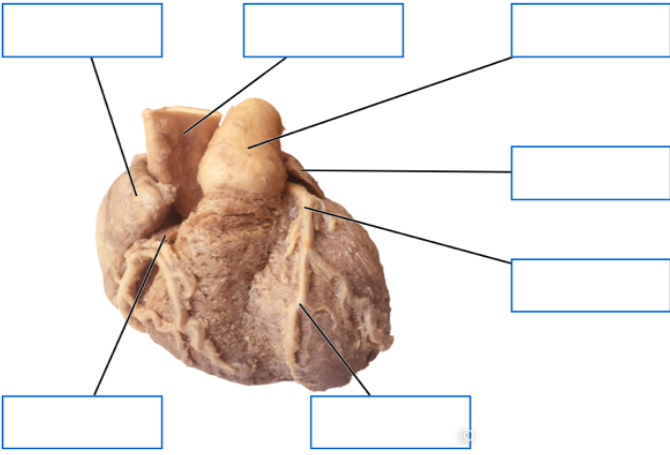
Left auricle

Left coronary artery

Pulmonary trunk

Right auricle

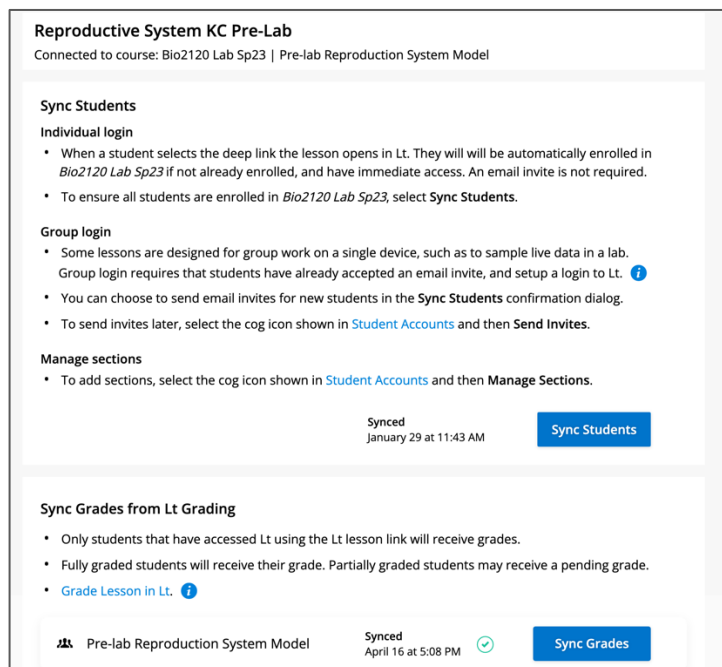
Right coronary artery



**Figure 7.** Drag and drop exercise to be completed after the guided dissection of an organ to help students reinforce their knowledge of structures identified in lab.

## Grading

Grades are promptly submitted and synced with the Canvas gradebook before the next lab period (Figure 8). The automated grade syncing is a great feature, which reduces the clerical burden, transcription error rate, and frees up time for other pedagogical activities.



**Figure 8.** Graphic user interface in Canvas for grade syncing with a graded KuraCloud module. Assignments are created, completed, and graded on KuraCloud, and grades are synced from Canvas by clicking on the assignment.

## Students' perspectives on KuraCloud

From the instructor's perspective KuraCloud has met the needs that I had identified for my students. However, the students' perspective often differs from that of the instructor's. Therefore, I have created an anonymous survey that I have asked students to complete on the week of April 11<sup>th</sup> 2023, which reflects the use of KuraCloud as their primary interactive digital lab book for a period of four months. The survey had five questions, which aimed to assess which (if any) aspects of this pedagogical model facilitate students' learning (please refer to full survey response with graphs below). Briefly, Question 1 asked students to select adjectives from a provided list to define KuraCloud. Students generally found KuraCloud to be *unique*, *innovative*, *fun*, and -most importantly- *helpful*. Two students out of thirty-eight found this platform to be *boring*. The "Other" adjectives that some students chose to attribute to KuraCloud are *interesting*, *helpful*, *interactive*, *fun*, and *visual*. Question 2 in the survey asked students to rate their "learning experience" with KuraCloud. Thirty-one out of thirty-eight students found this model conducive to learning, while seven were neutral about it. No student found this model to be unhelpful. Since KuraCloud offers multiple types of exercises, in Question 3 I have asked

students which types of exercises were most conducive to learning. Interactive work, figure annotation, and questions that invite students to reflect on concepts were identified as the most helpful tools. One student indicated that none of the provided options were helpful. Question 4 asked students to select the options that best reflect the ability to integrate applied work in the KuraCloud modules. Students favored the digital collection of data in lab and the integrated analysis (especially as it pertains to blood pressure and heart rate), followed by the ability to use KuraCloud modules as a central repository of information (*i.e.*, lab manual), including annotated digital pictures of histology slides taken in lab, and by the guided dissection of organs. While I provide a general overview of dissecting techniques, students often need a step-by-step guide, which is difficult for me to provide if I am managing up to twenty-four students at once in lab. Two people out of thirty-eight did not find the applied work useful. Finally, Question 5 asked students whether they would like to have a similar lab manual in other classes. Twenty out of thirty-eight students answered yes, and ten were neutral about it.

### **Summary**

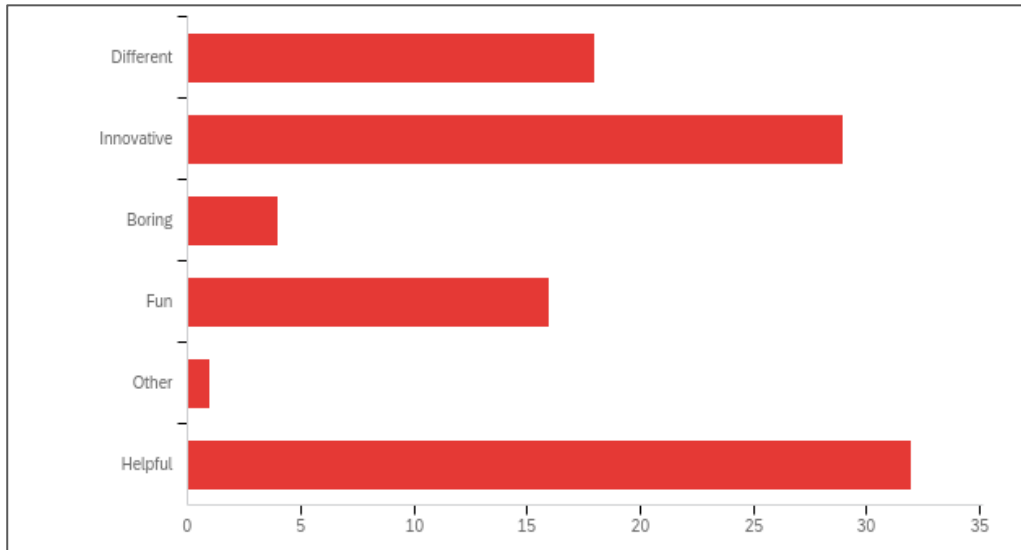
The Grant for Excellence in Teaching and Learning awarded in Spring 2022 was implemented in Fall 2022 and Spring 2023. During Fall 2022, I selected suitable modules and customized them to meet the learning objectives of APII labs. The platform was piloted in Spring 2023. The student experience with the KuraCloud platform in Spring 2023 has been generally positive, as shown by the students' responses on the survey, and by their direct communication with me. Additionally, students commented on the affordability of this digital platform since the cost is comparable to that of a paper workbook.

*Student survey below*

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Survey given on April 11th 2023, 9:34 am MDT

**Q1 - How would you define the KC platform? (You can select multiple answers).**



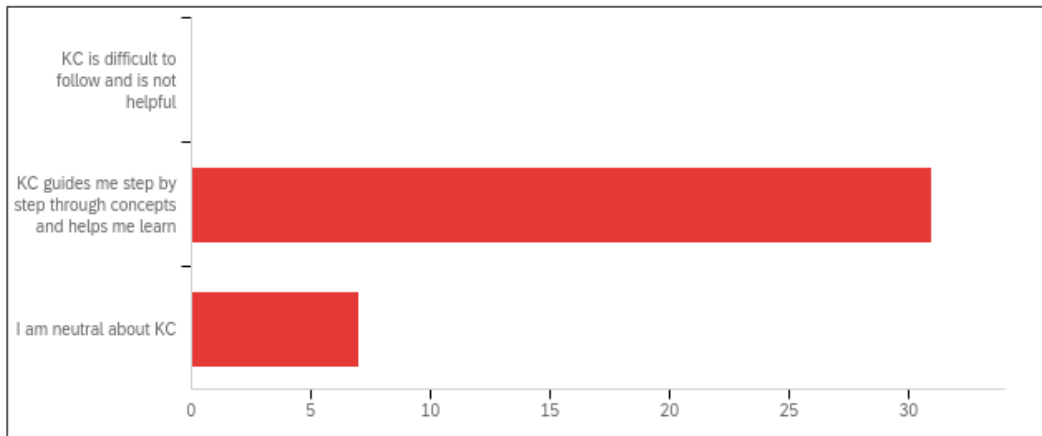
#	Answer	%	Count
1	Different	18.00%	18
2	Innovative	29.00%	29
3	Boring	4.00%	4
4	Fun	16.00%	16
5	Other	1.00%	1
6	Helpful	32.00%	32
	Total	100%	100

**Q1 “Other” - Write the term that describes what you think of KC.**

Write the term that describes what you think of KC.

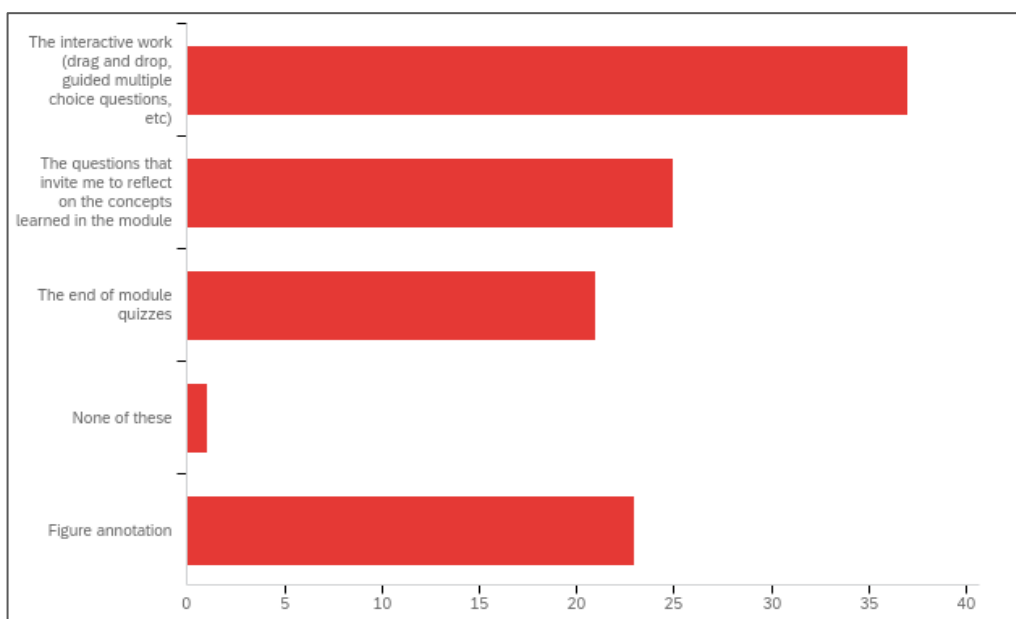
Interesting, helpful, interactive, fun, visual.

**Q2 - Pedagogical value: Please select the option that best describes your learning experience with KC.**



#	Answer	%	Count
1	KC is difficult to follow and is not helpful	0.00%	0
2	KC guides me step by step through concepts and helps me learn	81.58%	31
3	I am neutral about KC	18.42%	7
	Total	100%	38

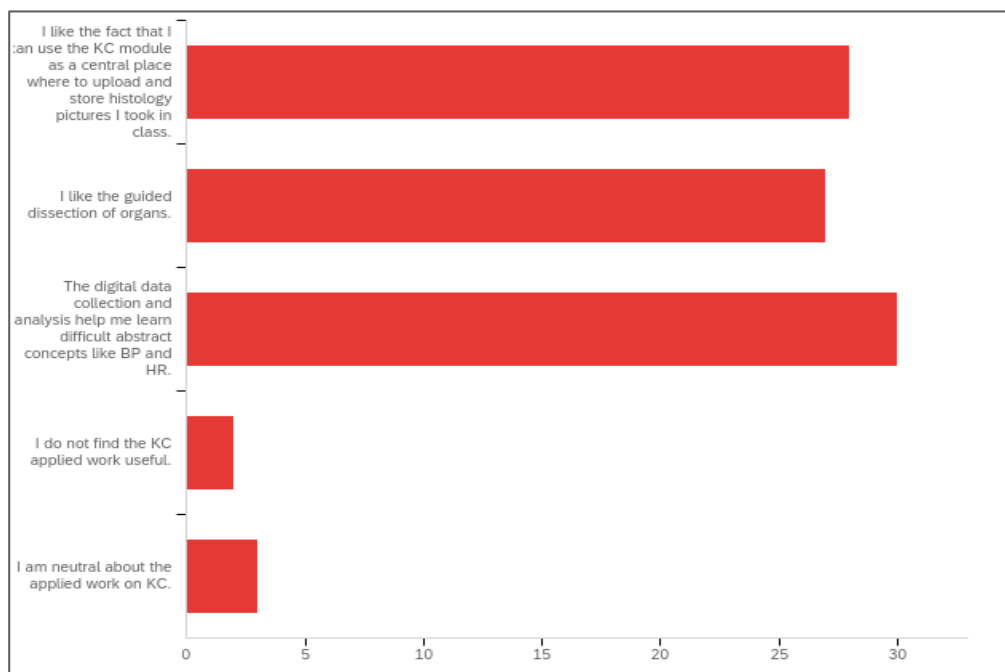
**Q3 - What aspect(s) of the KC experience help(s) you learn, if any? (You can select multiple answers).**





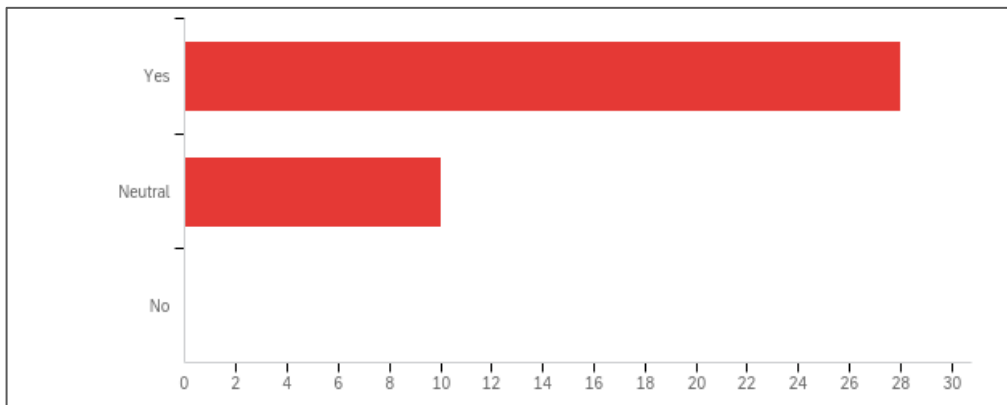
#	Answer	%	Count
1	The interactive work (drag and drop, guided multiple choice questions, etc)	34.58%	37
2	The questions that invite me to reflect on the concepts learned in the module	23.36%	25
3	The end of module quizzes	19.63%	21
4	None of these	0.93%	1
5	Figure annotation	21.50%	23
	Total	100%	107

**Q4 - Please select all that applies about the ability to integrate applied work in the KC modules. Applied work = implement what you learn in class/lab.**



#	Answer	%	Count
1	I like the fact that I can use the KC module as a central place where to upload and store histology pictures I took in class.	31.11%	28
2	I like the guided dissection of organs.	30.00%	27
3	The digital data collection and analysis help me learn difficult abstract concepts like BP and HR.	33.33%	30
4	I do not find the KC applied work useful.	2.22%	2
5	I am neutral about the applied work on KC.	3.33%	3
	Total	100%	90

**Q5 - Would you like to have a structured digital lab manual like KC in other classes?**



#	Answer	%	Count
1	Yes	73.68%	28
2	Neutral	26.32%	10
3	No	0.00%	0
	Total	100%	38