




Treemap Literacy: A Classroom-Based Investigation—Supplementary Material

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1. Treemap Literacy Assessment

The results of the treemap literacy assessment indicate how many treemap features the students correctly incorporate and interpret while creating an appropriate image (See Figure 1). The list of literacy test questions was provided to students for first assignment in 2019.

1. **Image:** the treemap image you are describing
2. **Name of Tool:** The tool that was used to generate the treemap
3. **Country:** Name of country(s) data shown
4. **Disease:** Name of disease(s) shown
5. **Year:** The year(s) or time-span of data shown
6. **Data Preparation:** A helpful description of how you prepared the data
7. **Color:** What is color mapped to?
8. **Hierarchy:** What is the data hierarchy contained in the treemap?
9. What is the leaf node size mapped to?
10. How are the leaf nodes laid out or positioned?
11. What are the internal nodes mapped to?
12. What is the internal node size mapped to?
13. Which treemap node layout algorithm is used?

2. Software Tool and Layout Algorithm Choice

The investigation of students' software choice showed that even though some students did not provide any software identification, 56 students (82%) preferred to use **Tableau** [CHS03], one of the popular commercial tools to create visualizations. However, caution must be used when interpreting this because we provide an explicit Tableau tutorial for the class. The other tool choices were **IBM Watson** [Wat13], **Microsoft Power BI** [Des03] etc. Forty eight students (71%) used a squarified treemap algorithm to obtain a treemap (see Figure 3). The overall result of software and treemap layout algorithm choice of the class in 2019 is displayed in the Figure 4.

3. Post-Interview Questions

1. Have you seen treemaps before? If yes, where?*
 2. Do you have a background in Data Visualization? If so, what is it?*
 3. How difficult did you find the test questions?*
 - 1-Not at all, 7-Very much
 4. Please expand why you felt the test questions difficult or easy.*
 5. Did you struggle to answer any questions? If yes, what in particular did you struggled with?*
 6. How helpful was the Treemap software and software demonstration? (Not applicable for the participants who took slide demonstration)
 - 1-Not at all, 7-Very much
 7. Why (or why not) do you think it was helpful? (Not applicable for the participants who took slide demonstration)
 8. Was the Treemap software effective enough to visualize the data hierarchy? (Not applicable for the participants who took slide demonstration)
 - 1-Not at all, 7-Very much
 9. Why (or why not) do you think it was effective enough? (Not applicable for the participants who took slide demonstration)
 10. Do you think you perform better on the test after the Treemap software demonstration? (Not applicable for the participants who took slide demonstration)
 11. Do you recommend any improvements to the software? (Not applicable for the participants who took slide demonstration)
 12. What is your level of English proficiency?*
- Fluent/Native or Bilingual
 - Full Professional
 - Professional Working
 - Limited Working
 - Elementary

References

- [CHS03] CHABOT C., HANRAHAN P., STOLTE C.: Tableau desktop, 2003. Last accessed: May 2019, <https://www.tableau.com/products/desktop>. 1
- [Des03] DESKTOP M. P.:, 2003. Last accessed: May 2019, <https://powerbi.microsoft.com/en-us/desktop/>. 1
- [Wat13] WATSON I.:, 2013. Last accessed: May 2019, <https://www.ibm.com/watson>. 1

Treemap Literacy Assessment 2018

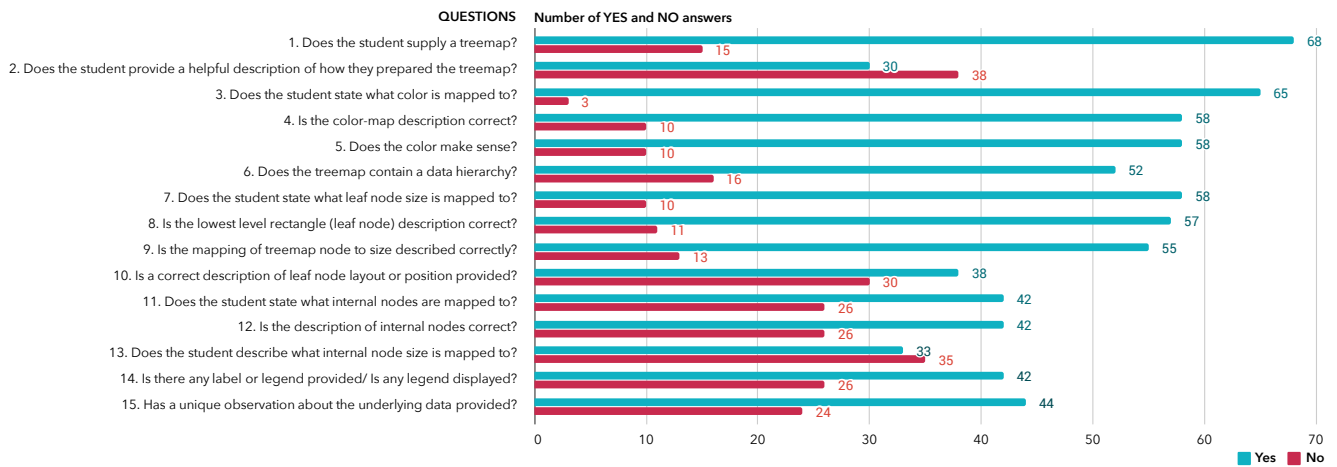


Figure 1: A treemap literacy assessment test results from the information visualization assignment in 2018. Questions 2, 6, 11, 12, and 13 indicate difficulties with the hierarchical aspect of treemaps.

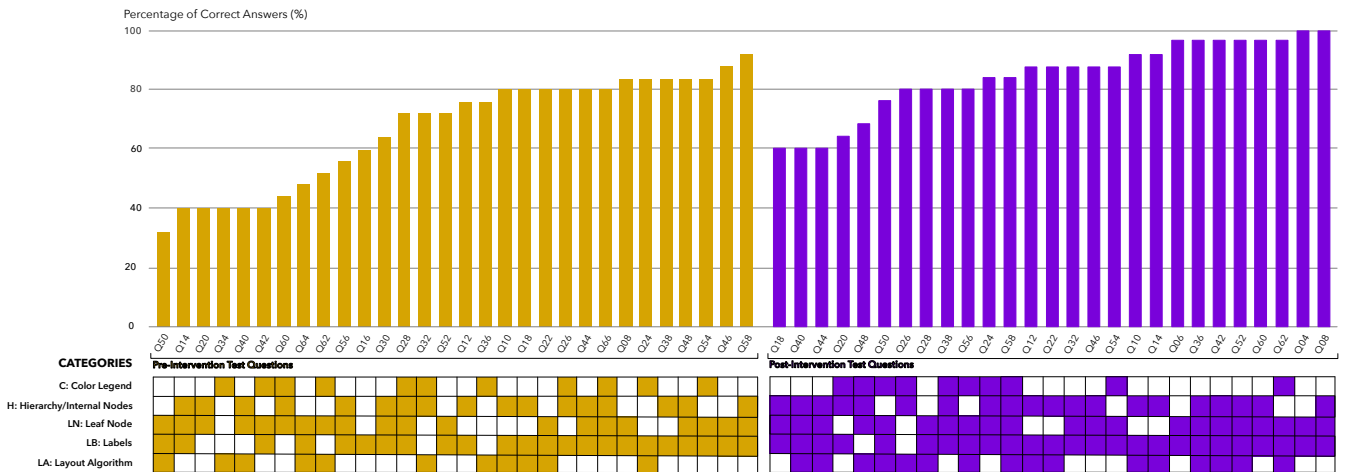


Figure 2: The percentage of correct answers and the classification of questions in the pre- and post-intervention tests.

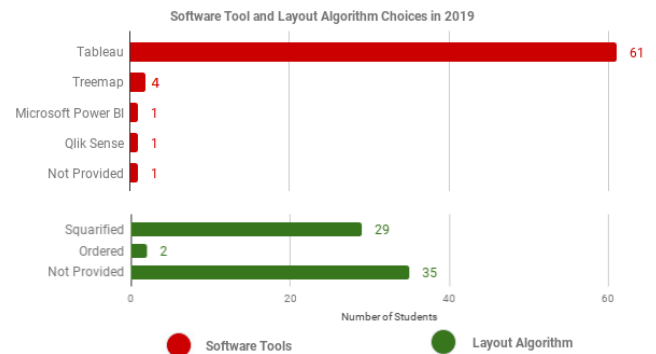
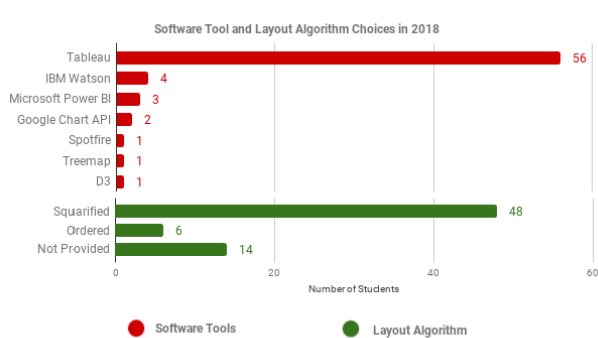
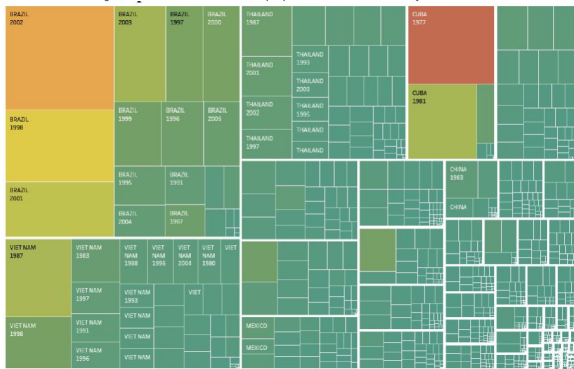


Figure 3: The results of software tools used and treemap layout algorithm in 2018.

Figure 4: The results of software tools used and treemap layout algorithm in 2019.

The following treemap shows the instances of a disease by country and year. Color is mapped to the percentage of number of cases which decreases from red to green. Size indicates the number of people with disease in the country.



Which of the following countries has the lowest total number of people with a disease?*

- China
- Thailand
- Cuba
- Brazil
- I am not sure

Figure 5: An example question from the Treemap Visualization Literacy Test.



Figure 6: A photo from the user study on treemap literacy with computer science students.

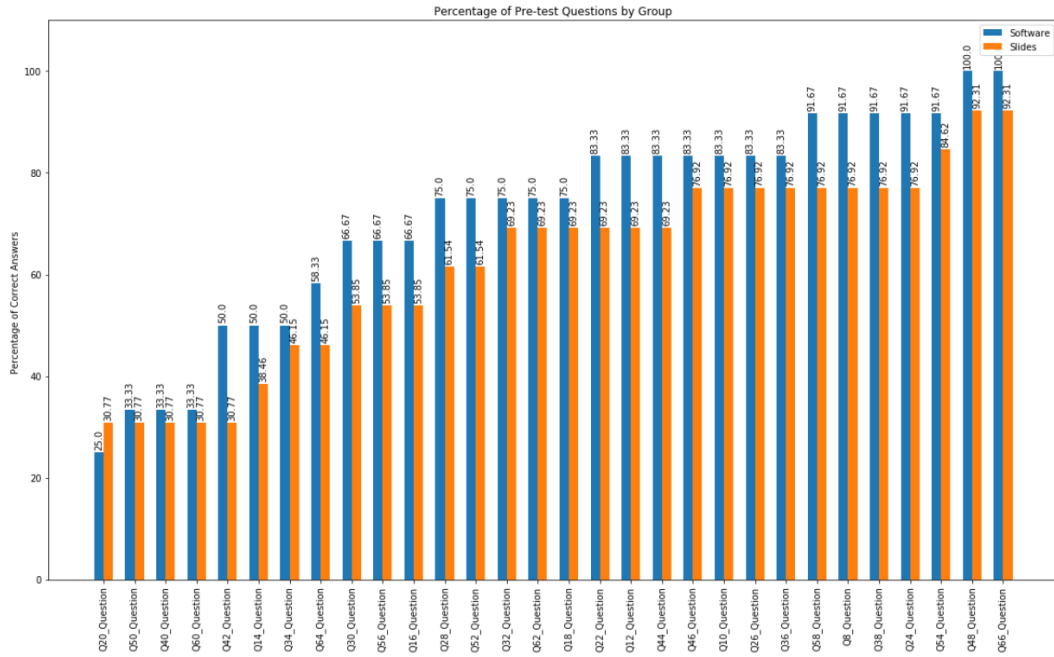


Figure 7: The percentage of correct answers on pre-intervention test questions for the SOFTWARE demonstration and SLIDES groups.

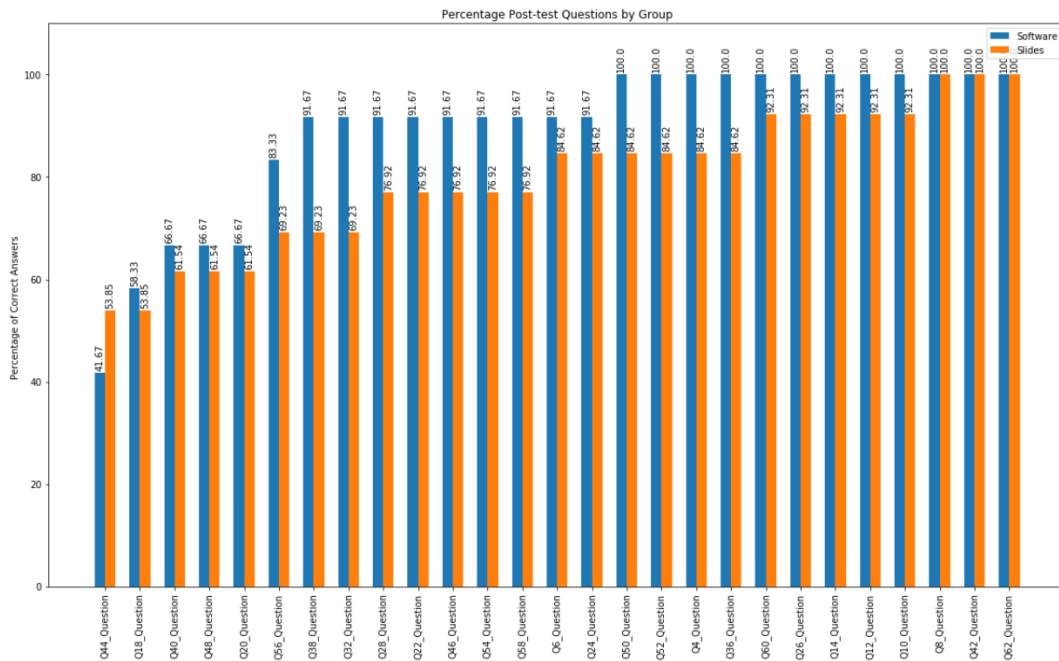


Figure 8: The percentage of correct answers on post-intervention test questions are shown for the SOFTWARE demonstration and SLIDES groups.

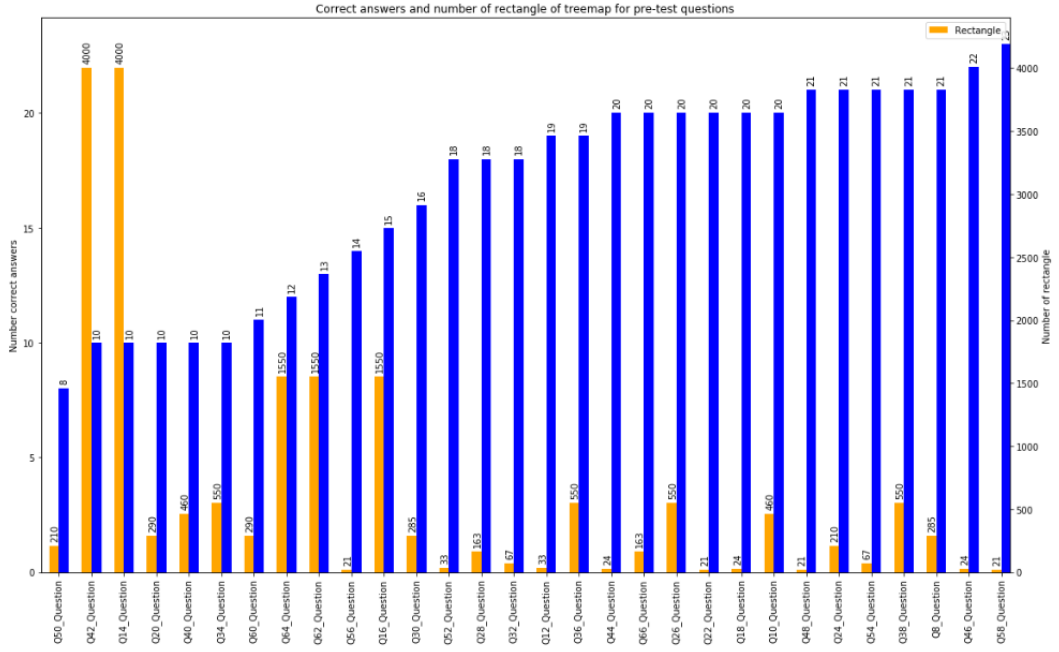


Figure 9: The number of rectangles on a treemap versus the number of correct answers on the pre-intervention test.

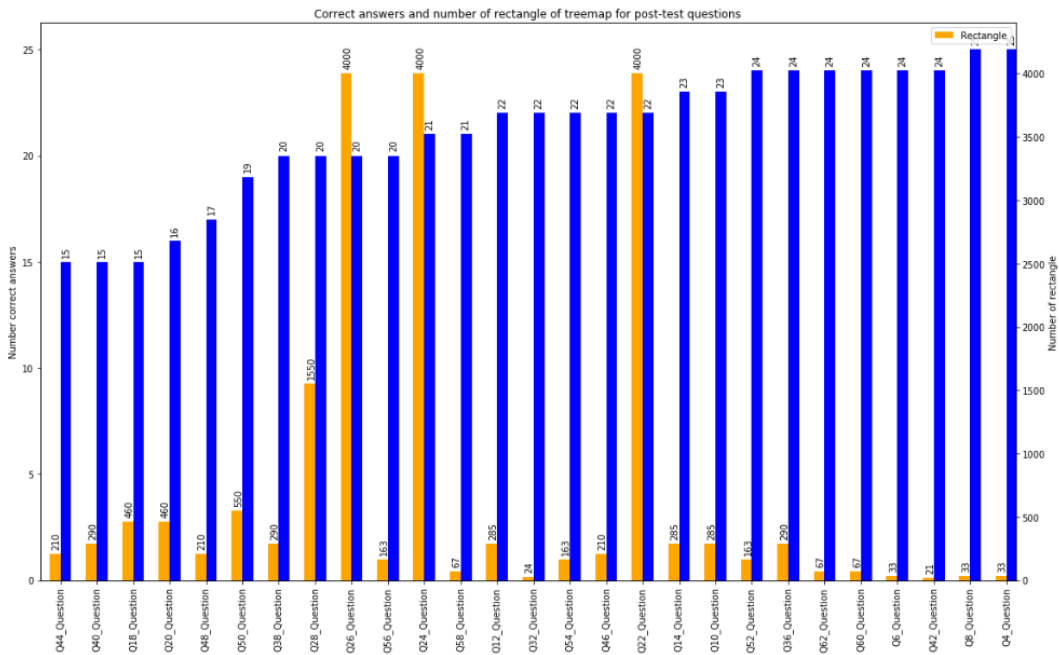


Figure 10: The number of rectangles on a treemap versus the number of correct answers on the post-intervention test.

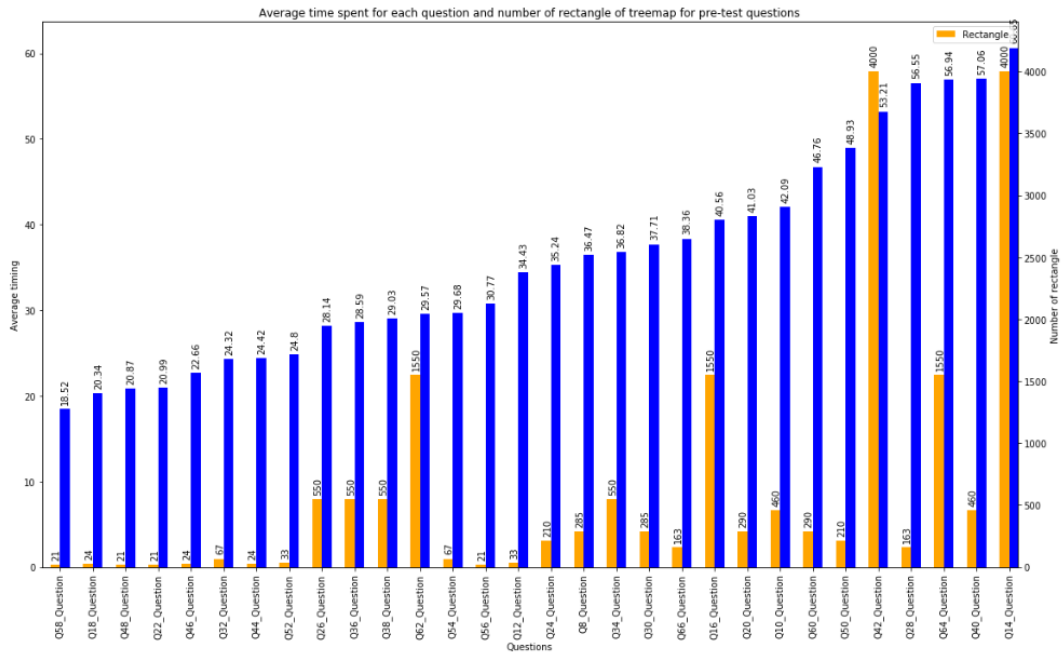


Figure 11: The number of rectangles on a treemap versus the average time spent on each question on the pre-intervention test.

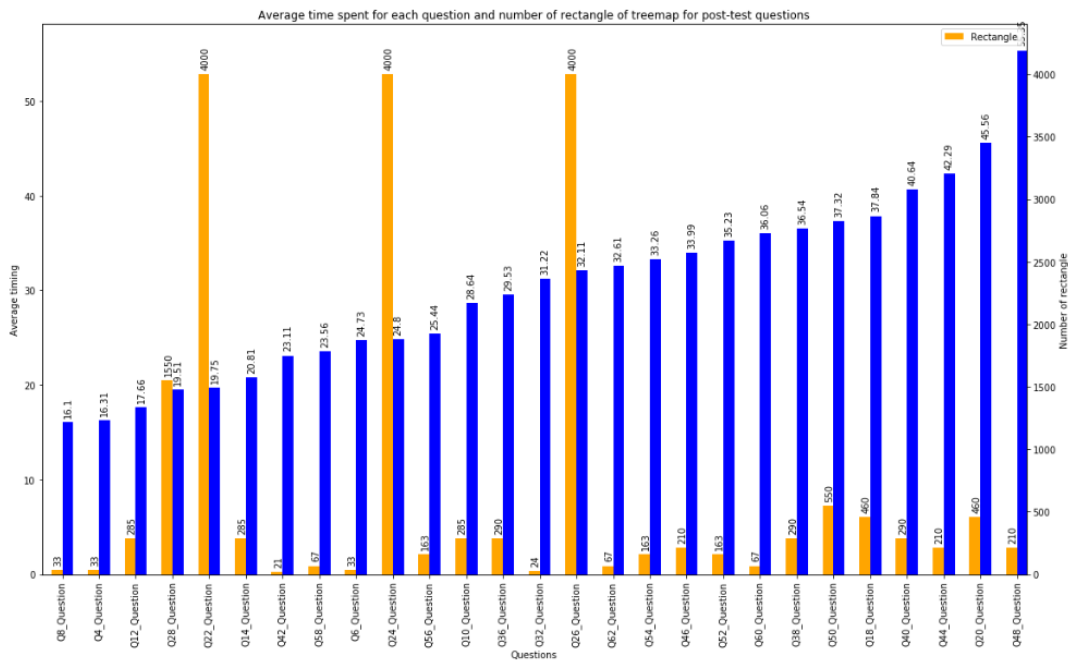


Figure 12: The number of rectangles on a treemap versus the average time spent on each question on the post-intervention test.

Correct answers and number of rectangle of treemap for pre-test questions

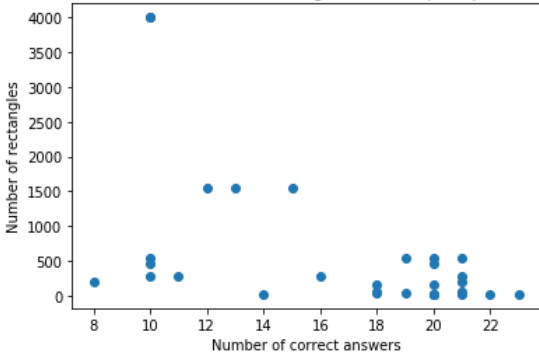


Figure 13: The number of rectangles on a treemap versus the number of correct answers on the pre-intervention test on scatterplots.

Average time spent and number of rectangle of treemap for each post-test questions

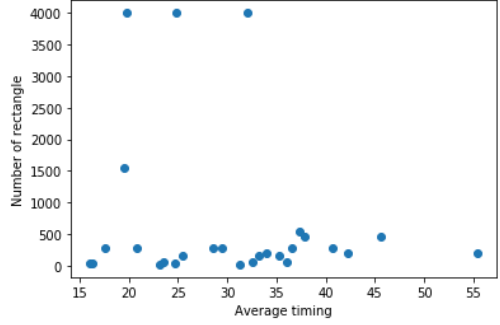


Figure 16: The number of rectangles on a treemap versus the average time for each task on the post-intervention test on scatterplots.

Correct answers and number of rectangle of treemap for post-test questions

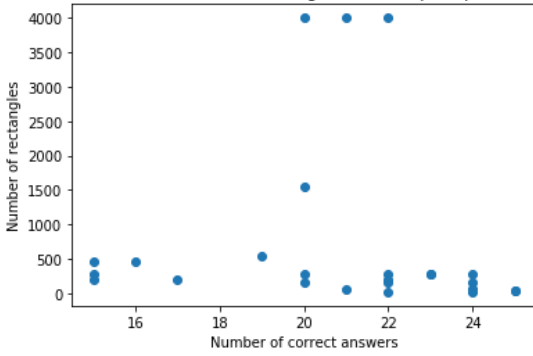


Figure 14: The number of rectangles on a treemap versus the number of correct answers on the post-intervention test on scatterplots.

Q2. Have you seen treemaps before? If yes, where? - Selected Choice

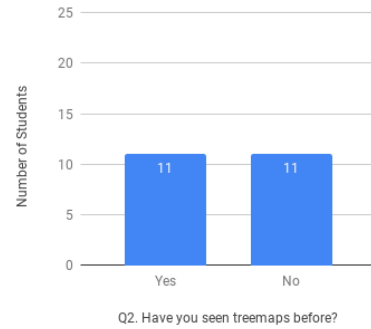


Figure 17: Yes or no answer of participants on whether they have seen a treemap before.

Average time spent and number of rectangle of treemap for each pre-test questions

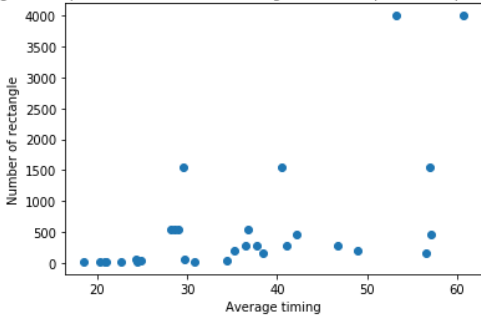


Figure 15: The number of rectangles on a treemap versus the average time for each task on the pre-intervention test on scatterplots.

Q3. Do you have a background in Data Visualization? If so, what is it? -

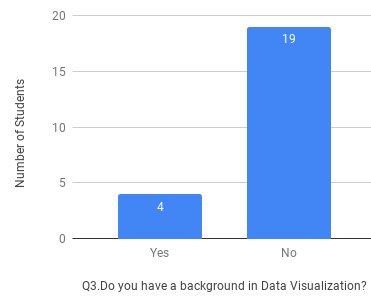


Figure 18: Yes or no answer of participants whether they have data visualization background.

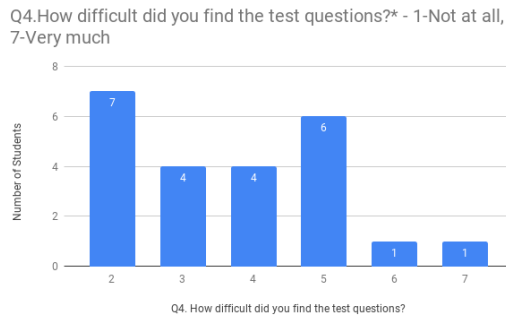


Figure 19: Rate of participants to degree how difficult they find the test questions.

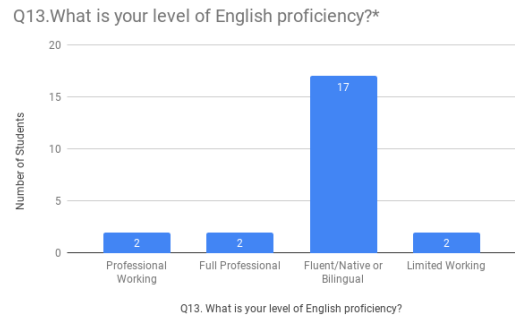


Figure 22: Answers of participant's level English proficiency.

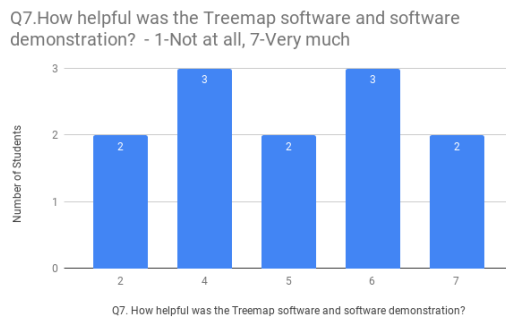


Figure 20: Rate of participants to degree how helpful they find the treemap software.

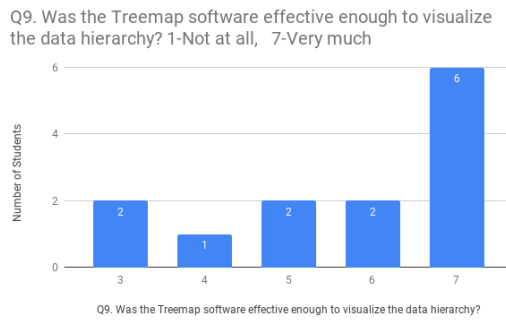


Figure 21: Rate of participants to degree how effective they find the treemap software.