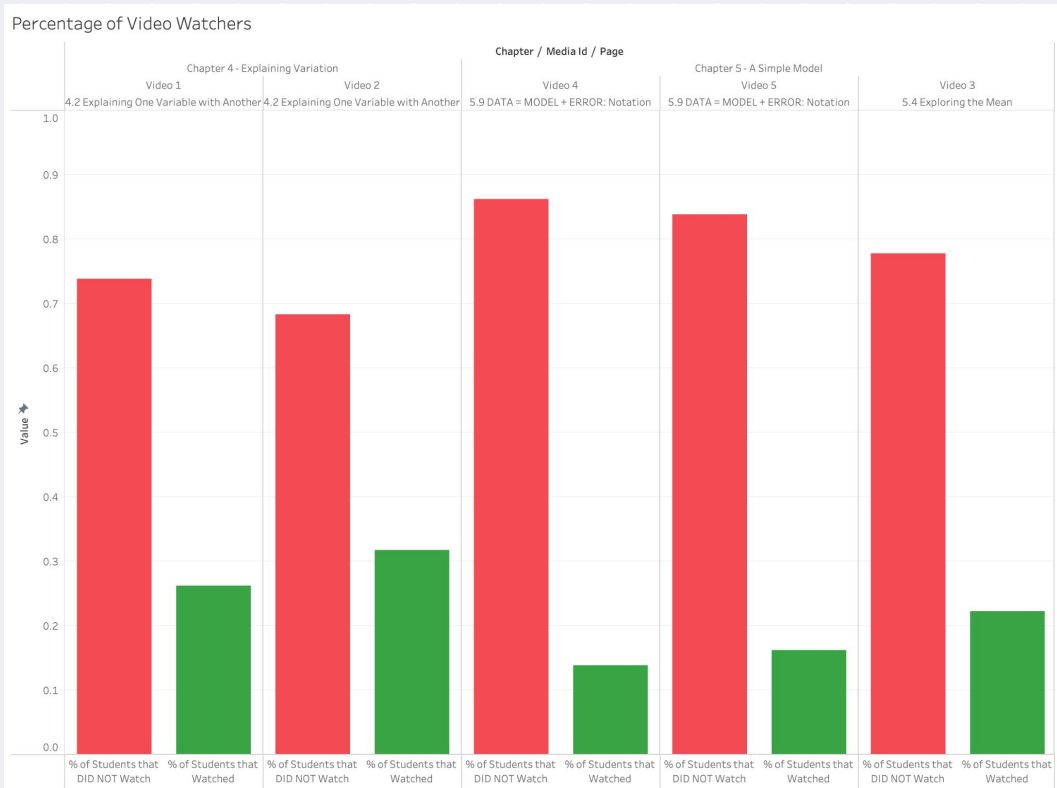# Metrics for success
CourseKata Data Analysis
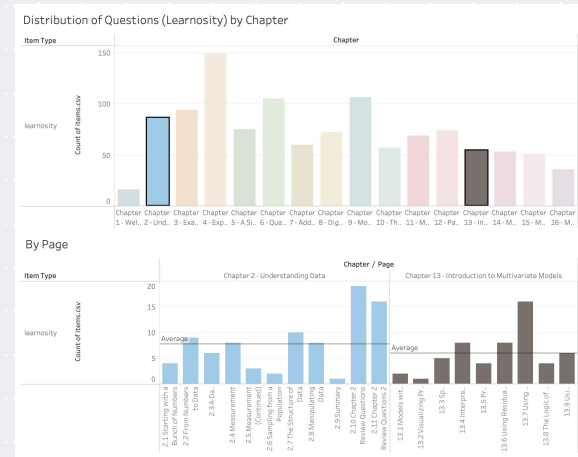
By Anand Patel, Cameron Hirsh, Hasan Hamdani, and David Wang

Team "Evidence over Bias" from UNC-C & UNC-CH
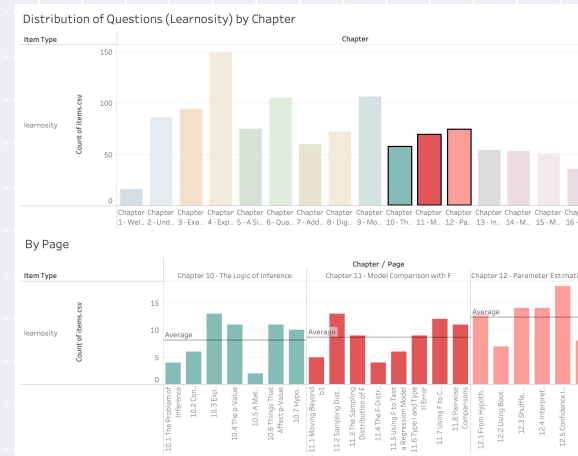
Percentage of Video Watchers

Chapter / Media Id / Page

Chapter 4 - Explaining Variation

Video 1 — 4.2 Explaining One Variable with Another
Video 2 — 4.2 Explaining One Variable with Another
Video 4 — 5.9 DATA = MODEL + ERROR: Notation

Chapter 5 - A Simple Model

Video 5 — 5.9 DATA = MODEL + ERROR: Notation
Video 3 — 5.4 Exploring the Mean

"Good" Metric Scoring Chapters

Distribution of Questions (Learnosity) by Chapter

By Page

"Bad" Metric Scoring Chapters

Distribution of Questions (Learnosity) by Chapter

By Page

We define the following metrics for student performance, within the context of a sample period. For a given student and a sample of time (e.g. one chapter), let

$|Q|$:= number of unique questions attempted
$|C|$:= number of correct submissions
$|A|$:= number of attempts
T := active time engaged, defined by

$$\sum_{t_i \in S}^{|S|} t_i$$

Using these, we obtain

$$final\ accuracy := \frac{|C|}{|Q|} \qquad persistence := \frac{\frac{|C|}{|Q|}}{\frac{|C|}{|A|}} = \frac{|A|}{|C|} \qquad efficiency := \frac{accuracy}{T}$$

chapter	mean	var	skew	kurtosis	Shapiro-Wilk	p-value
1	71.658	55.131	3.597	22.550	0.727	1.393×10^{-38}
2	187.602	97.757	0.950	2.031	0.952	2.981×10^{-15}
3	203.84	129.842	3.095	22.853	0.814	1.543×10^{-28}
4	214.208	143.917	2.557	13.665	0.830	3.212×10^{-26}
5	124.492	87.430	2.058	9.852	0.872	1.689×10^{-24}
6	168.779	120.841	1.934	7.006	0.867	1.257×10^{-24}
7	95.659	91.038	5.180	46.226	0.641	1.090×10^{-36}
8	86.860	74.089	3.028	16.969	0.770	5.575×10^{-31}
9	131.442	88.269	1.327	2.684	0.913	8.686×10^{-19}
10	99.090	86.231	2.881	14.515	0.772	2.338×10^{-32}
11	124.459	98.248	2.481	11.168	0.818	7.974×10^{-27}
12	102.948	94.914	3.171	15.86	0.738	9.010×10^{-32}
13	49.833	54.856	6.789	77.376	0.579	1.849×10^{-28}
14	89.382	65.410	3.127	18.454	0.781	3.533×10^{-13}
15	55.952	45.192	3.012	15.611	0.773	1.295×10^{-12}
16	37.064	27.034	2.094	7.348	0.838	2.766×10^{-10}

```
accuracy: KruskalResult(statistic=2097.201, pvalue=0.0)
engagement: KruskalResult(statistic=539.997, pvalue=9.346e-109)
persistence: KruskalResult(statistic=1905.620, pvalue=0.0)
```
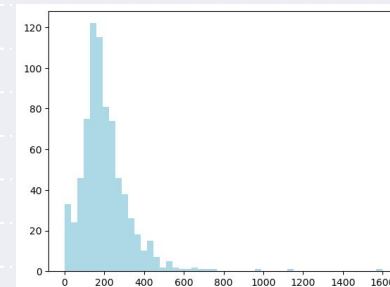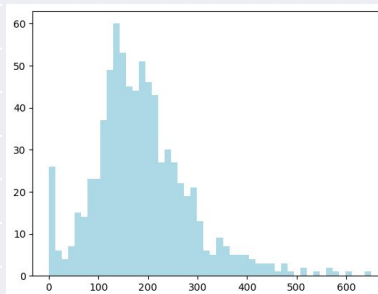
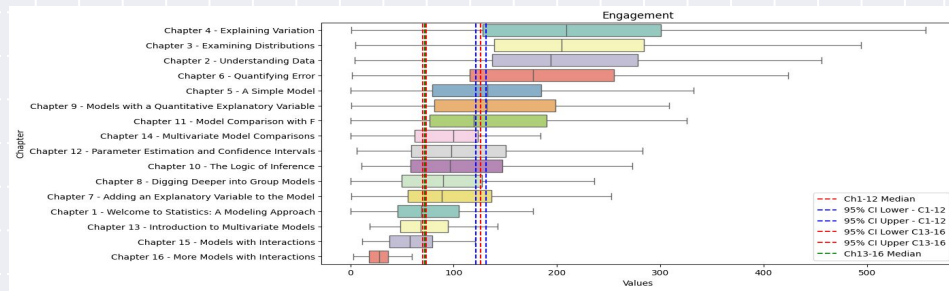$\rightarrow$
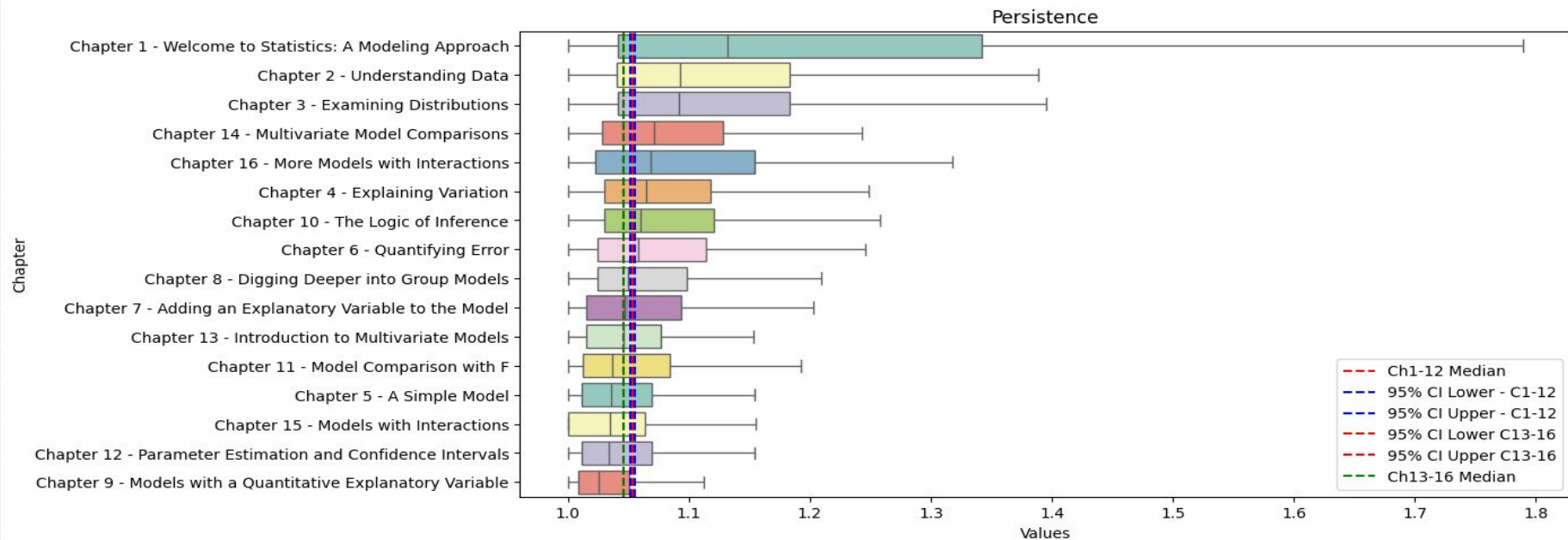
Table of values for engagement distributions *(top right)*
Distribution for chapter 2 *(bottom left)*
Distribution for chapter 3 *(bottom right)*

Metric-Based Analysis
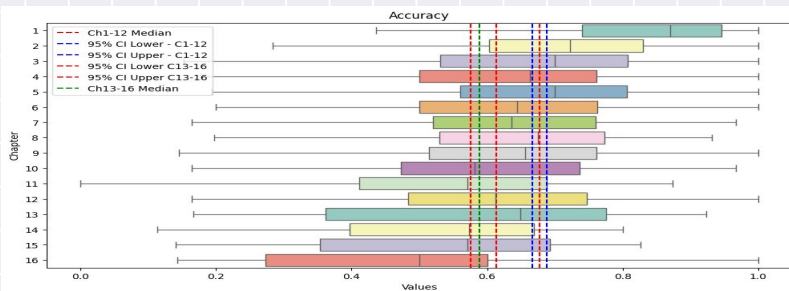
Sources

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Persistence Can Predict Achievement. (2022, July 26). Bloomsights. https://bloomsights.blog/2022/07/26/persistence-can-predict-achievement/#:~:text=A%20student%20with%20a%20strong

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Thanks!

We hope you enjoyed our presentation :)