

tigeR

Training mit individuell generierten Erfolgsmeldungen in R.

tigeR ist eine Übungsplattform für Statistikaufgaben, die semesterbegleitend zur Vorlesung und Praktika von Statistik I im Bachelor der Psychologie angeboten wird. Das Angebot ist ein freiwilliges Zusatzangebot und wurde ins Leben gerufen, da Studierende regelmäßig nach zusätzlichen Übungsaufgaben fragen, um ihr gelerntes Wissen aus Vorlesung und Praktikum testen zu können. tigeR ist **kein** alleinstehendes Selbstlerntool, sondern eine **Ergänzung** zur Überprüfung und Verfestigung von bereits erlerntem Wissen. Die Learning Outcomes sollten daher eher durch die Vorlesung erreicht und mit Hilfe von tigeR **überprüft** werden.

Die Übungen haben einen Fokus auf Statistik und Programmieren in R und sind im Multiple-Choice-Format. Damit die Plattform eigenständig und asynchron genutzt werden kann, arbeitet tigeR mit zwei Arten von automatisiertem Feedback. Das erste Feedback wird direkt nach dem Beantworten einer Frage gegeben: Man erfährt, ob die Antwort richtig oder falsch war und es wird inhaltlich erklärt, wieso die Antwort richtig oder falsch war. Falls die Antwort falsch war, wird nicht mitgeteilt, welche Antwort die richtige ist, damit die Aufgabe wiederholt werden kann. Das andere Feedback ist ein übergeordnetes Feedback zu globalen Kompetenzen. Die globalen Kompetenzen zu einzelnen Lernbereichen werden mit Hilfe eines psychometrischen Modells geschätzt. Das Besondere daran ist, dass die summative Performanz keine Rolle spielt, stattdessen aber Aufgabenschwierigkeiten bei der Schätzung berücksichtigt werden und Studierende Rückmeldung erhalten, wo sie sich mit ihrer

Kompetenz relativ im Vergleich zum Durchschnitt befinden.

tigeR beinhaltet aktuell einen Aufgabenpool von 52 Aufgaben.

Planned ECTS: , **Number of learners:** 180, **Mode of delivery:** Online

Status: COMPLETED, **Course public access:** Private

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Course learning outcome	Level	Weight
Ability to compute an effect size	Remembering	1
Ability to choose the correct statistical test for a given scenario	Applying	5
Interpreting the outcome of a statistical test correctly	Understanding	5
Explaining the difference between a sample and population	Understanding	1
Ability to determine what kind of study was conducted	Evaluating	3
Describing the different types of data and their characteristics correctly	Remembering	3
Recognizing type of data in a given scenario	Applying	3
Understanding sampling variability	Understanding	2
Ability to describe and interpret visualizations of distributions	Analysing	3
Ability to interpret a probability in the context of data	Understanding	2
Interpreting measures of central tendency in the context of data	Understanding	3
Understanding and interpreting measures of variability	Understanding	3

Ability to compute a confidence interval	Remembering	3
Ability to interpret a confidence interval	Understanding	3
Ability to compute a p-value	Remembering	3
Ability to interpret a p-value	Understanding	5
Ability to draw reasonable conclusions based on a hypothesis test	Evaluating	5
Explaining the logic and purpose of a hypothesis test	Understanding	3
Ability to determine a null and alternative hypothesis statement based on a research question	Applying	5
Correlation does not imply causation	Understanding	2
Explaining linear relationships	Understanding	2
Ability to use a least-squares regression equation to make a prediction	Applying	1
Choosing the appropriate graphical representation for given parameters of a distribution	Applying	3
Generating code in R	Creating	5
Identifying errors and warnings	Understanding	2
Utilizing error messages to make corrections	Evaluating	5
Using the basics of syntax of R language correctly	Applying	5
Ability to think algorithmically to solve a statistical problem	Applying	2
Checking assumptions	Evaluating	2
Ability to interpret regression weights	Understanding	2
Explaining the concept of regression	Understanding	3
Ability to use a statistical test appropriately	Applying	5
Total Weight: 100		

Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Assessment		
							Points	Types	Providers

Statistical Thinking

Ability to compute an effect size (**100%**), Describing the different types of data and their characteristics correctly (**100%**), Ability to compute a confidence interval (**100%**), Ability to compute a p-value (**100%**), Interpreting the outcome of a statistical test correctly (**100%**), Explaining the difference between a sample and population (**100%**), Understanding sampling variability (**100%**), Ability to interpret a probability in the context of data (**100%**), Interpreting measures of central tendency in the context of data (**100%**), Understanding and interpreting measures of variability (**100%**), Ability to interpret a confidence interval (**100%**), Ability to interpret a p-value (**100%**), Explaining the logic and purpose of a hypothesis test (**100%**), Correlation does not imply causation (**100%**), Explaining linear relationships (**100%**), Ability to interpret regression weights (**100%**), Explaining the concept of regression (**100%**), Ability to choose the correct statistical test for a given scenario (**100%**), Recognizing type of data in a given scenario (**100%**), Ability to determine a null and alternative hypothesis statement based on a research question (**100%**), Ability to use a least-squares regression equation to make a prediction (**100%**), Choosing the appropriate graphical representation for given parameters of a distribution (**100%**), Ability to use a statistical test appropriately (**100%**), Ability to describe and interpret visualizations of distributions (**100%**), Ability to determine what kind of study was conducted (**100%**), Ability to draw reasonable conclusions based on a hypothesis test (**100%**), Checking assumptions (**100%**)

Representation of data

Generating a plot that represents a distribution. Generating a plot like a histogram, density plot, etc. given specific parameters.	30 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
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Interpret statistical parameters based on graphical representations of statistical distributions. Students are given graphical representations of distributions and should evaluate the underlying statistical parameters and properties of the distributions.	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Explain different data types and their characteristics Nominal, categorical, interval, and absolute scale.	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Total unit workload	1h								
Measures of central tendency									

<p>Compute measures of central tendency</p> <p>Compute measures of central tendency such as mean, median, mode.</p>	30 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
<p>Understand the concept of central tendency and its measures</p>	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
<p>Total unit workload</p>	0.75h								
<p>Measure of variability</p>									
<p>Understand the concept of variability and its measures</p>	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
<p>Compute measures of variability</p> <p>Compute measures of central tendency such as standard deviation, standard error, variance.</p>	30 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No

Total unit workload	0.75h								
Study design									
Distinguish between different study designs E.g., experiment, quasi-experiment, observational study, etc.	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Understanding the relationship of sample size and sampling variability	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Total unit workload	0.5h								
Hypothesis testing									
Generate null and alternative hypotheses based on given research question	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No

Check assumptions and understand assumption violations	30 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Conduct a complete hypothesis test	60 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Choose the appropriate hypothesis test for a given scenario E.g., t-test, one-sample Z-test, Chi2-test, correlation test, ...	45 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Interpret the significance of a p-value p-value < .05 and p-value > .05	30 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Total unit workload	3h								
Confidence intervals									

Compute confidence intervals using provided data. Students calculate confidence intervals either from raw data or from given statistics (mean, standard error).	30 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Interpret confidence intervals from given examples or scenarios.	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Total unit workload	0.75h								
Bivariate Data									
Correctly interpret and identify linear relationships E.g., from scatterplots.	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Total unit workload	0.25h								

Probability									
Applying the concept of probability For example, how to measure probability	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Exploring Probability Concepts through Simulations In combination with R.	30 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Total unit workload	0.75h								
Regression									
Compute predicted values from linear regression. By hand and using R functions.	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No

Contextual interpretation of regression weights in a given scenario. Standardized and non-standardized regression weights.	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Illustrating the concept of regression through visual representations. Integrating concepts such as predicted values, residuals, regression weights via graphical representation.	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Total unit workload	0.75h								

Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Assessment		
							Points	Types	Providers
<h2>Computational Thinking</h2> <p>Identifying errors and warnings (100%), Using the basics of syntax of R language correctly (100%), Ability to think algorithmically to solve a statistical problem (100%), Utilizing error messages to make corrections (100%), Generating code in R (100%)</p>									
<h2>Programming</h2>									
Navigate the environment of R Setting the working directory; checking variables in the global workspace; installing and loading libraries	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Understand different variable types Strings, numerical, boolean, factors, ...	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No

Understand and use a function Syntax of functions, arguments, output	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Total unit workload	0.75h								
Debugging									
Solving code that generates an error message Students will be confronted with a code that gives an error message and are tasked to correct the code. For that, they need to understand the error message and correct the mistake.	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No

<p>Understand error messages Understand what an error message is; how to "use" it; which information you can get out of it</p>	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
<p>Use the help function Knowing how to use the help function; how and where to find information on how to use a function</p>	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
<p>Total unit workload</p>	0.75h								
<p>Statistical Coding</p>									
<p>Organize data Reading in data; preprocessing; create data.frames & vectors; recode values; factorize vectors; rename columns; etc.</p>	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No

Plot data Write code that generates a graphical plot	15 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Analyse data - descriptively Derive summary statistics; calculate measures of central tendency and variability; calculate effect sizes	45 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
Analyse data - inferentially Conduct hypothesis tests	60 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No

<p>Exploring a dataset Trying to get a feeling for the data at hand by e.g. looking at several descriptive measures (such as range of data, etc), looking at column names, looking at the size of the data, how many participants, what was the subejct of the study, etc.</p>	10 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	No
<p>Total unit workload</p>	2.41h								

Total course workload: 12.41h