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Bildungswerk der Sächsischen Wirtschaft

European Ecological Federation

Kariyer Danismanligive Insan Kaynaklarini Gelistirme Dernegi

Research Game - The European scientific research game
Game play guide

What do you need to play?

Did you get the registration? Did you have a team? Now it's time to play. Follow the steps and keep in mind that you can earn score during the Phase 1 in order to participate to the European online competition (Phase 2) with a starting score. Good luck!

- Preparation to the game
- Play - Phase 1
- Play - Phase 2

PREPARATION TO THE GAME

Contents and link about the topic are available on the web platform

- Study in detail the topic: acquire knowledge on the game topic and content (see the BIODIVERSITY)
- Study in detail the methodology: acquire the methodology of the scientific-thematic research (see the SCIENTIFIC METHOD)
- Study in detail the game: understand the game, read the documentation, build a local team and get international links (see THE GAME STEP BY STEP)

PHASE 1

During this first phase you can carry out a research project in order to partecipate to the Phase 2 with a starting score. Products will be realized in English.

- CARRY OUT A RESEARCH PROJECT: carry out practical activities in order to get experiences on research projects

- From GENERAL to SPECIFIC: consider the definitions and study the concepts, search for explanations and then study some examples
- STUDY IN DETAIL the TOPIC: define the key words, use it to search for information on web, learn how to select the sources, select material

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Lifelong Learning

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- ORDER: go to the foundations of the selected topic: what is known, what is still not known, what we still need to know or to understand
- TOWARDS the Understanding: formulate questions you feel relevant to add knowledge and search for answers. Are there questions still not answered
- MAKE your RESEARCH: start your research activities
- MAKE THE SCIENTIFIC HYPOTHESES: scientific hypotheses - null hypothesis - (see page 3) and alternative hypothesis. When do you accept an hypothesis? The error risks (see page 3)
- EXPERIMENTAL 'TEST': How test a hypothesis (see page 3)? What information do you need? How much information do you need for what error risk?
- EXPERIMENTAL DESIGN: how collect information? Identify the general information and choose the method (see page 4): random, systematic, stratified, multi-stage
- SAMPLING TECHNIQUES: choose the technique in order to collect information
- DESCRIBE the RESULTS: fix and describe the theoretical concepts, try to transform it in mathematic concepts
- ANALYSE the RESULTS: perform a general statistical analysis (see page 4) and eventually prepare statistical tests on the hypotheses
- COMPARE the RESULTS: compare your products and results with those of other teams
- MAKE THE RESEARCH PRODUCTS: prepare one final product of your research (report/paper or poster or video in English [see the guidelines on the platform])

PHASE 2

During this second phase you will compete at European scale with other students. The game will be available in German, English, Italian, Portuguese, Turkish.

- ONLINE COMPETITION: play the competition with students of other countries

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Null hypothesis:

Potential working 'null' hypothesis (H_0):

1) The species composition (or species body size or species phenology) is the same in different habitat types*.
2) The species composition is the same in natural areas and areas disturbed by anthropogenic activities.
3) The species composition is the same in different geographical areas.
4) The species composition is the same in different seasons.
n) ……

Examples of operational 'null' hypothesis (H_0):

1) Grassland species composition is the same in farmed and not-farmed fields* (or in inland and coastal dune habitats or….).
2) Grassland plants have same type of leaves in cultured and not cultured fields* (or inland and coastal dune habitats or….).
3) The diversity of cat mantles is the same comparing blocks of buildings in the same town or different towns
4) The colour of flowers is the same in grasslands, dunes, woodlands, coastal chaparral….

*Habitat types: e.g., from coastal marine habitat to mountain prairies (selected by every school/team according to their geographical location and nearby landscape habitats)

Error risks:

1. In statistics, a type I error (or error of the first kind) is the incorrect rejection of a true null hypothesis.
2. A type II error (or error of the second kind) is the failure to reject a false null hypothesis.

	H_0 is actually:	
	True	**False**
Reject H_0	Type I error	Correct
Accept H_0	Correct	Type II error

Hypothesis testing:

The way to determine whether a statistical hypothesis is true is to examine a random sample from the population. If sample data are not consistent with the statistical hypothesis, the hypothesis (i.e., null hypothesis) is rejected.
Practical activities to test the 'null' hypothesis (H0):

- sample more than one selected area
- find and collect specimens

- compile the results
- perform the statistical analysis

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Methods:

Random - it is the ideal choice as it is a 'perfect' random method. Using this method, individuals are randomly selected from a list of the population and every single individual has an equal chance of selection.

Systematic - is a frequently used variant of simple random sampling. When performing systematic sampling, every element from the list is selected from a randomly selected starting point. For example, if we have a listed population of 6000 members and wish to draw a sample of 2000, we would select every 30th (6000 divided by 200) person from the list. In practice, we would randomly select a number between 1 and 30 to act as our starting point.

Stratified - is a variant on simple random and systematic methods and is used when there is a number of distinct subgroups, within each of which it is required that there is full representation. A stratified sample is constructed by classifying the population in sub-populations (or strata), base on some well-known characteristics of the population, such as age, gender or socio-economic status. The selection of elements is then made separately from within each strata, usually by random or systematic sampling methods.

Multi-stage - is a frequently-used, and usually more practical, random sampling method. It is particularly useful in situations for which no list of the elements within a population is available and therefore cannot be selected directly. As this form of sampling is conducted by randomly selecting subgroups of the population, possibly in several stages, it should produce results equivalent to a simple random sample.

Statistics:

Descriptive statistics are used simply to describe the sample you are concerned with. They are used in the first instance to get a feel for the data, in the second for use in the statistical tests themselves, and in the third to indicate the error associated with results and graphical output.

Many of the descriptions or "parameters" such as the mean will be familiar to you already and probably use them far more than you are aware of. For instance, when have you taken a trip to see a friend without a quick estimate of the time it will take you to get there (= mean)? Very often you will give your friend a time period within which you expect to arrive "say between 7.30 and 8.00 traffic depending". This is an estimate of the standard deviation or perhaps standard error of the times taken in previous trips. The more often you have taken the same journey the better the estimate will be. It is the same when measuring the length of the forelegs of a sample of donkeys in a biological experiment.

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