

**Task 5-1: Literature research: Questionnaire design**

Consult multiple sources (remember to cite them) to learn more about how to conduct a survey.

- a) When planning a survey, which aspects and typical problems do you need to consider?
- b) Search for methods for how to develop a research question and hypotheses, and how to *operationalize* their aspects. Explain these methods.
- c) What are the different kinds of questions to put in a questionnaire and what are their respective pros and cons?
- d) Read about the question wording in a questionnaire. What are the criteria for good questions? List the Do's and Dont's and provide examples to explain them.

**Task 5-2: Design of Questionnaire**

You chose a topic and formulated a research question in Task **4-2**. Using your methodological knowledge from Task **5-1**, it is now time to design and implement a suitable questionnaire. In the interest of finding many participants, it should be as short as possible. To be evaluated easily and unambiguously, it should ask for as highly structured information as possible.

Perform the following steps:

- a) Use a method you found in Task **5-1 b)** and write down how you want to operationalize which aspects of your research question.
- b) Since your questionnaire should be web-based, look for and choose a platform for conducting an online survey. Explain your choice.
- c) Implement the first version of your questionnaire. Consider that another group is going to review and run pilot tests with your questionnaire. The closer the version created now resembles the final version, the more helpful the results of the pilot tests will be.
- d) Consider the following aspects and write down your considerations:
  - For each of your questionnaire items: How do they contribute to your research question?
  - What are the characteristics of your eventual survey participants: General experience, specific experience, skills, work environment, domain/background, and other demographic information.
  - How do you plan to obtain a high number of participants and return rate? High numbers of participants are almost always an important quality attribute for surveys.

In addition to your normal KVV submission, make sure your wiki-page now contains the following new content:

- Short explanation of your operationalization (from step **a**).
- Your considerations from step **d**).
- Link to your online survey.

## Task 5-3: Quality criteria for research



**If you haven't watched the lecture "The Scientific Method" yet, stop right here and catch up on that:**

[http://www.inf.fu-berlin.de/inst/ag-se/teaching/V-EMPIR-videos/02\\_scientific\\_method/02\\_scientific\\_method.html](http://www.inf.fu-berlin.de/inst/ag-se/teaching/V-EMPIR-videos/02_scientific_method/02_scientific_method.html)

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Please work on this task individually.

**a)** Using your own words *and the terminology* introduced in the lecture mentioned above, answer the following questions:

1. What is an *hypothesis*? Give an example and name its aspects according to the terminology.
2. What does *control* mean? Give examples for a study design with little and for a greater extent of control, respectively.
3. What are *extraneous variables*? Give at least three examples. In practice, can you get rid of them? What is the relation between the amount of *control* in a study and the occurring *extraneous variables*?

For the following questions, suppose a study which is designed as a *controlled experiment* which aims at comparing two software design methods A and B with regard to the time it takes to complete a task T, and the quality of the resulting artifacts.

4. Why do you want to have way more than just two teams working on the task T (i.e. one with method A and one with method B)?
5. How could one maximize the internal validity? Give at least two ideas. What would then happen to the external validity, and why? Explain a scenario where a decreased internal validity does not affect external validity.
6. What would happen (in terms of tendencies) to the internal and external validity of the study (and why) in the following case:  
You have 40 subjects split equally in an experimental and a control group. But instead of letting all subjects work on task T, you split both groups again, and let them work on task T1 and T2, respectively, such that each subject works on one of the two tasks with one of the two methods.

**b)** Below you find a list of quality criteria for "good" research. Make sure you understand the meaning of each.

Visualize or describe the relations between the listed quality criteria (how they depend, influence each other, etc.) and explain the relation.

- Validity
- Objectivity
- Reliability
- Internal Validity
- External Validity
- Relevance
- Credibility
- Replicability