S 02

Data Analytics for Data Scientists

Design of Experiments (DoE)

Suggested solutions for Exercise 02: Principles

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Suggested solution 01

Study design

Which study design would you choose?

Description of the study – summary

Research question: Which title for the quarterly newsletter for current customers (made at least one purchase) will increase the open rate?

There are three versions for the newsletter: The current title, a title that announces a competition, and a title that announces a gift. The mailing list has approx. 12,000 customer names.

Which study design would you choose

Randomized controlled trial

Description of the study – summary

In an article the newspaper «Blick» wants to know how its readers are doing.
Readers interested in the question can access this page with one click:

> ### How are you?
>
> How are you? is an everyday question that can trigger many things and often conceals some things.
> We therefore ask: How are you really doing?
> What has a positive and negative effect on your basic mood?
> What do you talk openly about and what is more of a taboo in Switzerland?
>
> Proceed

Which study design would you choose

Survey with population = "Blick" readers

Description of the study – summary

Swisscom is updating its «TV Air» browser for laptops and desktops. Three weeks after the release, it evaluates the user responses by the «community». The responses are divided into «satisfied users» and «unsatisfied users.» Their profiles make it possible to extract the following information, among other things: Browser type, operating system, download speed.

Which study design would you choose

Case-control study with exposure = browser type, operating system, download speed

Suggested solution 02

Selecting a suitable study design

A study will be conducted to answer these research questions:
- ◦ Do different language learning media affect the intensity of situational interest of two-year-old children?
- ◦ How do different language learning media affect vocabulary growth?
- ◦ Does adult company while using language learning media have an impact on vocabulary growth?

These two language learning media are in focus:
- ◦ App for learning vocabulary
- ◦ Viewing of picture cards

Which study type would you choose?
In which areas of empirical research would you situate the study?

Also use the decision tree for study type in the appendix on page …

Please answer in a few informative sentences.

Suggested answers to the questions

The example comes from Walter-Laager et al. (2017)[1]

Excerpt from page 1065

> **Method**
> *Research design*
> The study comprised three phases, which were conducted over a 2-month period. In the first phase, parents completed a questionnaire on their family background, the interests of the children, and their access to tablet computers and (picture) books. At the same time, we administered the "Language Development Test for 2-year-olds" (SETK-2) (Grimm, Aktas, & Frevert, 2000) to the children in the sample so as to measure their general receptive and productive vocabulary. Then, we also tested the specific vocabulary of the intervention. In the second phase, 5 weeks later, each child was allowed to play for a maximum of 20 minutes, either alone or accompanied by the investigator. The children played with either the word-learning app "Lingua Kidz"[3] on a tablet computer,[4] or with picture cards extracted from the app. Finally, in the third phase, we administered the post-test, which tested the specific vocabulary that the children might have acquired through the intervention. To yield a control variable, we measured in this phase the cognitive skills of the child (by means of several subtests of the "Development test for children from 6 months to 6 years of age" (ET 6-6) (Petermann, Stein, & Macha, 2006).

Excerpt from page 1067

Table 2: The timeline of the study and the sample groups			
Early December 2013	*Mid-January 2014*		*Late January 2014*
• Parent questionnaire • Pre-test: General and specific vocabulary	**Intervention groups**	Group "Tablet computer with adult accompaniment" Group "Tablet computer without adult accompaniment" Group "Picture cards with adult accompaniment"	• Post-test: Specific vocabulary and cognitive skills
	Control group	Group "Picture cards without adult accompaniment"	

[1] Walter-Laager, Catherine; Brandenberg, Kathrin; Tinguely, Luzia; Schwarz, Jürg; Pfiffner, Manfred R.; Moschner, Barbara (2017): Media-assisted language learning for young children. Effects of a word-learning app on the vocabulary acquisition of two-year-olds. In: Br J Educ Technol 48 (4), p. 1062-1072.

The study used three intervention groups and one control group.
The children were randomly assigned to one of the four groups.

The intervention groups were defined as follows
- ◦ Using an **app** for learning words **with** the help of an adult
- ◦ Using an **app** for learning words **without** the help of an adult
- ◦ Using **image cards** for learning words **with** the help of an adult.

There was one control group
- ◦ Using **image cards** for learning words **without** the help of an adult.

Language ability was measured with the "SETK-2"*(Language Development Test for 2-year-olds)*
The SETK-2 measures language processing ability with four subtests using test material suitable for children.
Numerical values are collected and statistically analyzed.
In particular, the mean values of the intervention groups and the control group are compared using analysis of variance (ANOVA → Lecture 07) and correlation coefficients are calculated.
These are typical phases of the research process in quantitative empirical methods.

This is an experimental study → **RCT**