FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

Academic Skills II – Lecture 4

Plenary Session: Quantitative Research Part 1
B-BCI 2020
Summersemester 2022

Group 1: Melanie Hense, BA, MA → melanie.hense@fhwn.ac.at
Group 2: Mag. Severin Maurer, BA → severin.maurer@fhwn.ac.at
Group 3: Mag. Dr. Karin Wegenstein → karin.wegenstein@fhwn.ac.at

Course Leader: Melanie Hense, BA, MA – melanie.hense@fhwn.ac.at
Institute of Market Research & Methodology

Group 2 - Maurer

	Date/Session-Type	Content
1	23.02.2022 – 16:30-18:00 LECTURE (Plenary Maurer)	• Course Structure • Structure of a Research Proposal • *Brief recap of the course topics (Academic Skills I)*
2	28.02.2022 – 13:30 – 17:00 LECTURE (Plenary Hense)	• Introduction to Qualitative Research • Interactive Workshop
3	01.03.2022 – 14:00 – 15:30 GROUP SESSION 1 (in Groups - Maurer)	• Describing a qualitiative research design • Forming Student-Research Groups • Assignment → Finding a qualitative research question + designing an interview guideline
4	10.03.2022 – 14:00 – 16:30 LECTURE (Plenary Hense)	• In-depth Qualitative Research • Qualitative Data Analysis
5	17.03.2022 – 09:00 – 12:30 LECTURE (Plenary Maurer)	• Introduction to Quantitative Research • Questionnaire Construction
6	17.03.2022 – 13:00 – 14:30 GROUP SESSION 2 (in Groups - Maurer)	• Describing a quanitative research design • Assignment →Finding a quanitative research question + designing a questionnare
7	28.03.2022 – 13:30 – 16:00 LECTURE (Plenary Maurer)	• Analysing quantitative data
8	28.03.2022 - ZUB	• Other forms of research – Introduction to the Science Lab
9	31.03.2022 09:00-11:00 LECTURE (Plenary Wegenstein)	• Ethics in Research
10	05.04.2022 11:00 – 12:30 LECTURE (in Groups – Maurer)	• Last Tips: Wiriting a Good Research Proposal (incl. Q&A for your project)
11	07.04.2022 ZUB	• Presenting empirical results
12	04.05.2022 – 13:30 – 17:30 GROUP SESSION 3 - PRESENTATIONS (in Groups – Maurer)	• Presentation of empirical results • Getting to know the Science Lab
13	08.06.2022 – 13:00 – 14:30 GROUP SESSION 4 (in Groups – Maurer)	• Global Feedback incl. Q & A

Group 2 - Maurer

	Date/Session-Type	Content
1	23.02.2022 – 16:30-18:00 LECTURE (Plenary Maurer)	• Course Structure • Structure of a Research Proposal • *Brief recap of the course topics (Academic Skills I)*
2	28.02.2022 – 13:30 – 17:00 LECTURE (Plenary Hense)	• Introduction to Qualitative Research • Interactive Workshop
3	01.03.2022 – 14:00 – 15:30 GROUP SESSION 1 (in Groups - Maurer)	• Describing a qualitiative research design • Forming Student-Research Groups • Assignment → Finding a qualitative research question + designing an interview guideline
4	10.03.2022 – 14:00 – 16:30 LECTURE (Plenary Hense)	• In-depth Qualitative Research • Qualitative Data Analysis
5	17.03.2022 – 09:00 – 12:30 LECTURE (Plenary Maurer)	• Introduction to Quantitative Research • Questionnaire Construction
6	17.03.2022 – 13:00 – 14:30 GROUP SESSION 2 (in Groups - Maurer)	• Describing a quanitative research design • Assignment →Finding a quanitative research question + designing a questionnare
7	28.03.2022 – 13:30 – 16:00 LECTURE (Plenary Maurer)	• Analysing quantitative data
8	28.03.2022 - ZUB	• Other forms of research – Introduction to the Science Lab
9	31.03.2022 09:00-11:00 LECTURE (Plenary Wegenstein)	• Ethics in Research
10	05.04.2022 11:00 – 12:30 LECTURE (in Groups – Maurer)	• Last Tips: Wiriting a Good Research Proposal (incl. Q&A for your project)
11	07.04.2022 ZUB	• Presenting empirical results
12	04.05.2022 – 13:30 – 17:30 GROUP SESSION 3 - PRESENTATIONS (in Groups – Maurer)	• Presentation of empirical results • Getting to know the Science Lab
13	08.06.2022 – 13:00 – 14:30 GROUP SESSION 4 (in Groups – Maurer)	• Global Feedback incl. Q & A

Group 2 - Maurer

	Date/Session-Type	Content
1	23.02.2022 – 16:30-18:00 LECTURE (Plenary Maurer)	• Course Structure • Structure of a Research Proposal • *Brief recap of the course topics (Academic Skills I)*
2	28.02.2022 – 13:30 – 17:00 LECTURE (Plenary Hense)	• Introduction to Qualitative Research • Interactive Workshop
3	01.03.2022 – 14:00 – 15:30 GROUP SESSION 1 (in Groups - Maurer)	• Describing a qualitiative research design • Forming Student-Research Groups • Assignment → Finding a qualitative research question + designing an interview guideline
4	10.03.2022 – 14:00 – 16:30 LECTURE (Plenary Hense)	• In-depth Qualitative Research • Qualitative Data Analysis
5	17.03.2022 – 09:00 – 12:30 LECTURE (Plenary Maurer)	• Introduction to Quantitative Research • Questionnaire Construction
6	17.03.2022 – 13:00 – 14:30 GROUP SESSION 2 (in Groups - Maurer)	• Describing a quanitative research design • Assignment →Finding a quanitative research question + designing a questionnare
7	28.03.2022 – 13:30 – 16:00 LECTURE (Plenary Maurer)	• Analyzing quantitative data
8	28.03.2022 - ZUB	• Other forms of research – Introduction to the Science Lab
9	31.03.2022 09:00-11:00 LECTURE (Plenary Wegenstein)	• Ethics in Research
10	05.04.2022 11:00 – 12:30 LECTURE (in Groups – Maurer)	• Last Tips: Wiriting a Good Research Proposal (incl. Q&A for your project)
11	07.04.2022 ZUB	• Presenting empirical results
12	04.05.2022 – 13:30 – 17:30 GROUP SESSION 3 - PRESENTATIONS (in Groups – Maurer)	• Presentation of empirical results • Getting to know the Science Lab
13	08.06.2022 – 13:00 – 14:30 GROUP SESSION 4 (in Groups – Maurer)	• Global Feedback incl. Q & A

Necessary tools

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

qualtrics XM

fhwn.qualtrics.com

SPSS
AN IBM® COMPANY

Necessary tools

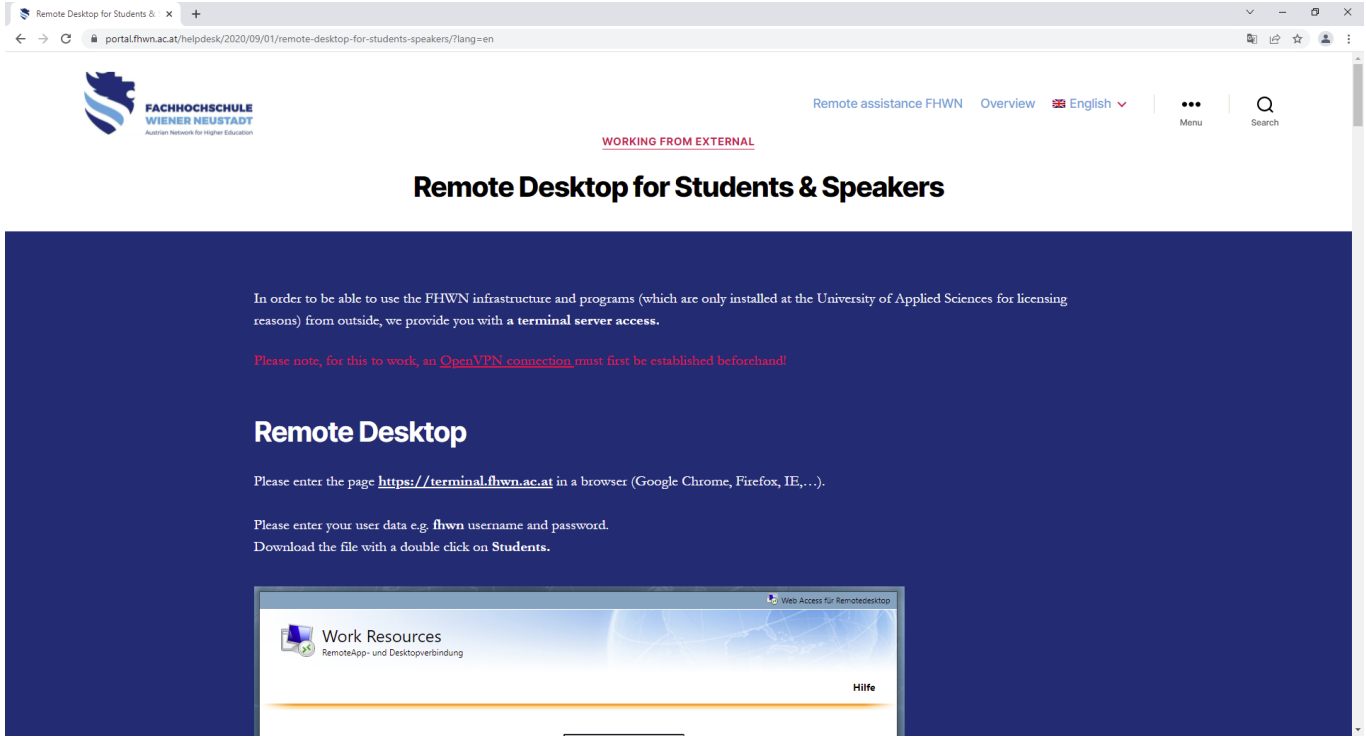
FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

FOR DESIGNING YOUR SURVEY AND COLLECTING YOUR DATA

FOR ANALYZING YOUR COLLECTED DATA STATISTICALLY

SPSS can be used via terminal server access (Remote Desktop) → see also the helpdesk information

Necessary tools



FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

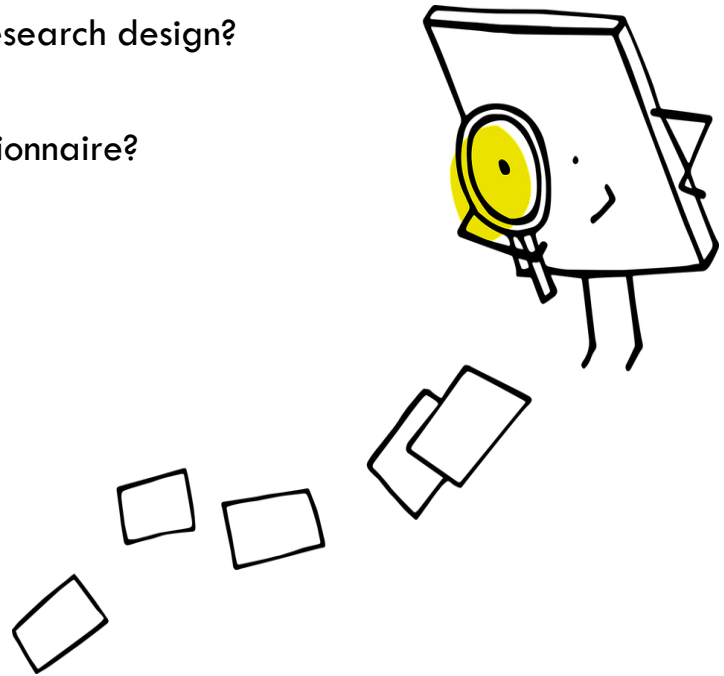
Source: Fallon, Marianne. 2016. *Writing Up Quantitative Research in the Social and Behavioral Sciences*. Rotterdam, Boston, Taipei: Sense Publishers

Learning Outcomes

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

1. What does “doing quantitative research” mean?
2. What kind of questions can I answer with a quantitative research design?
3. What methods do exist when researching quantitative?
4. What are variables and why do I need them for my questionnaire?
5. How do I design a quantitative questionnaire?
6. How do I define my sampling method?
7. How do I describe a quantitative research design?
8. What happens next (group assignment)?



FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

1. What does “doing quantitative research” mean?

1. What does “doing quantitative research” mean?

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

The research process

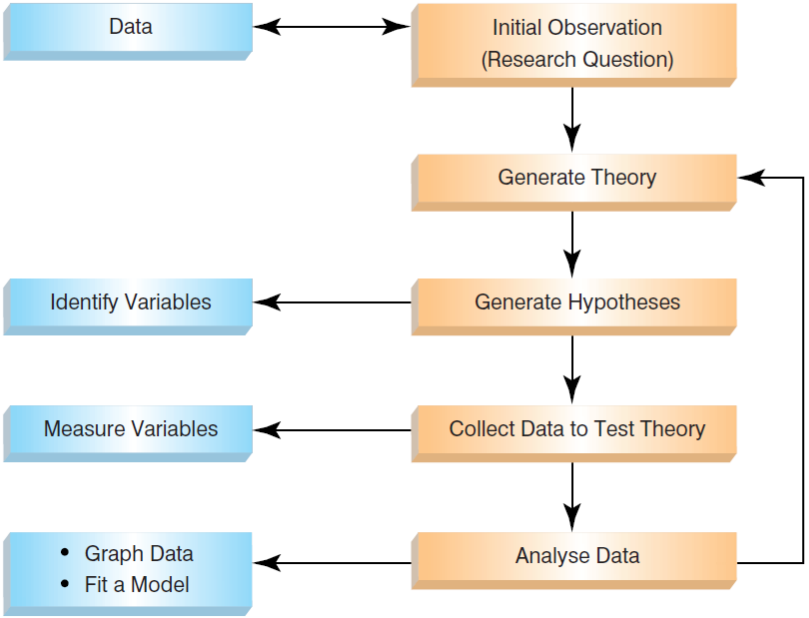


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

The research process

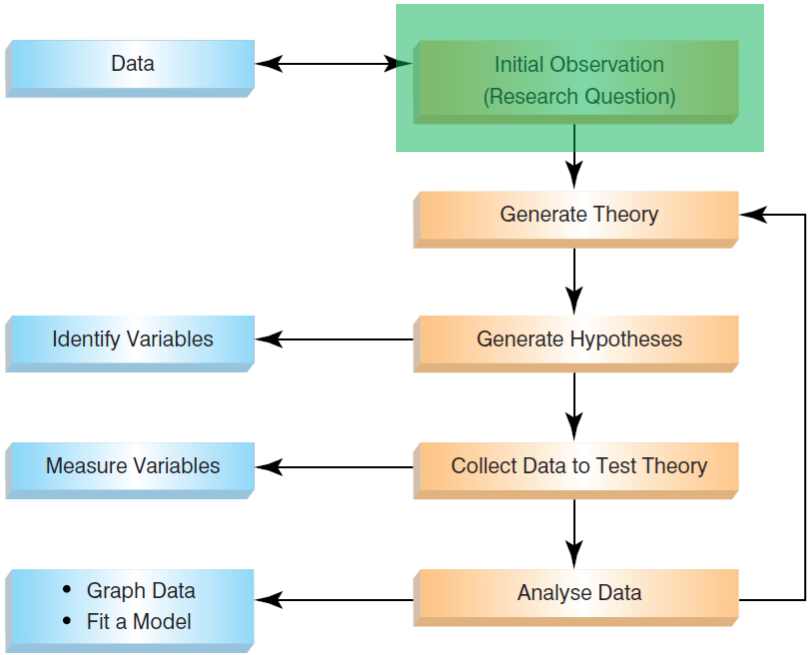


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

The research process

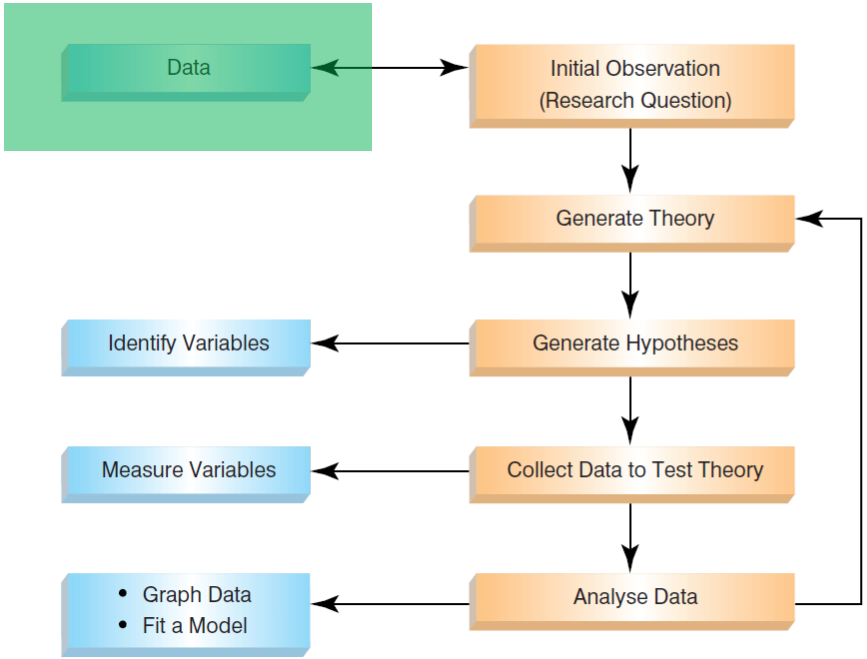


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

The research process

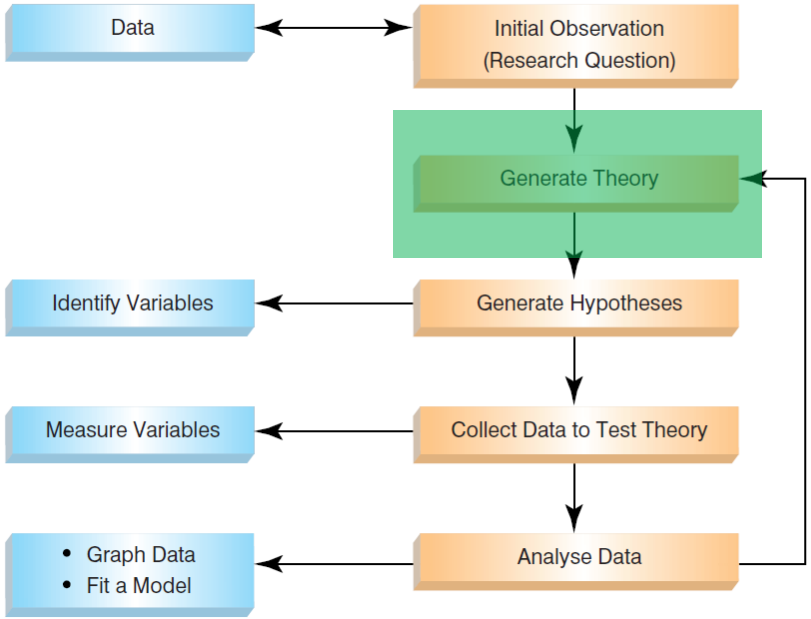


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

The research process

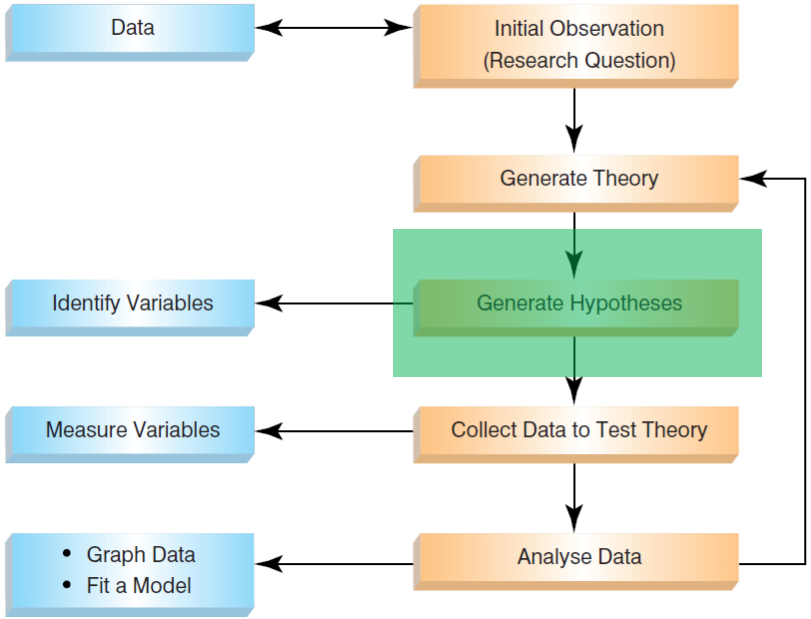


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

The research process

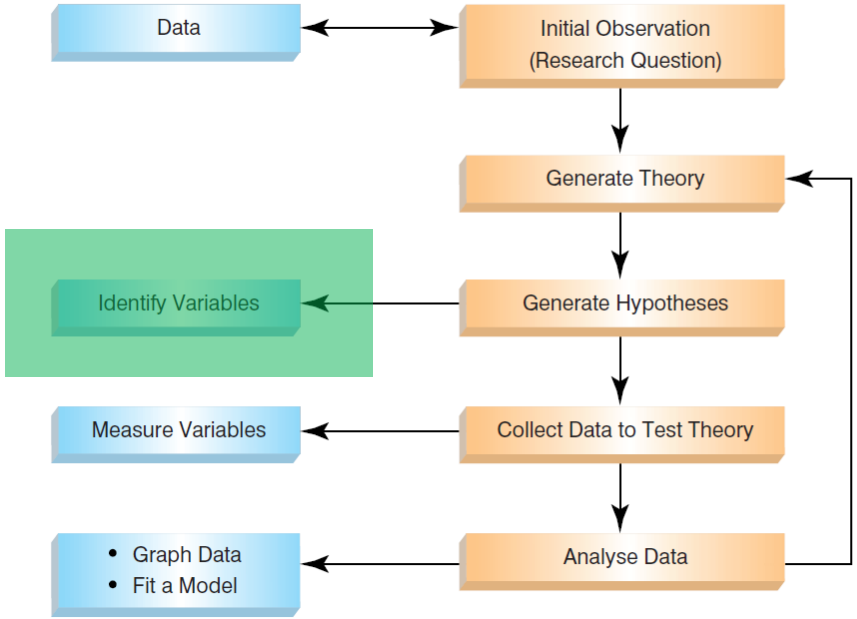


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

The research process

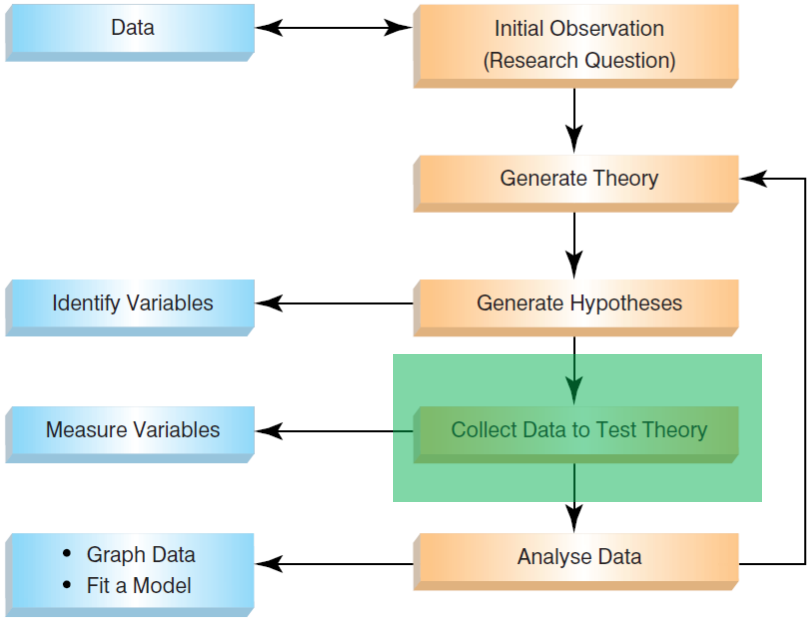


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

The research process

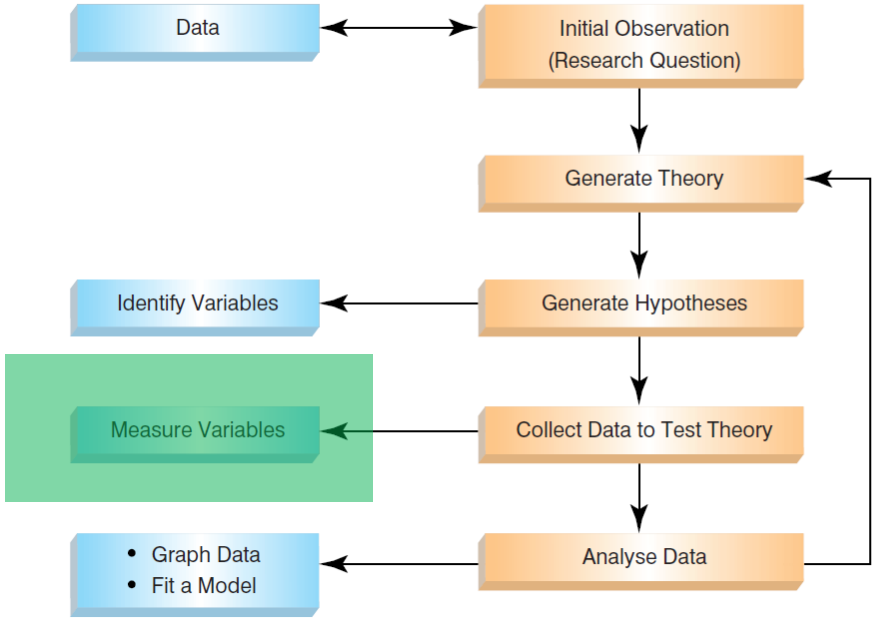


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

The research process

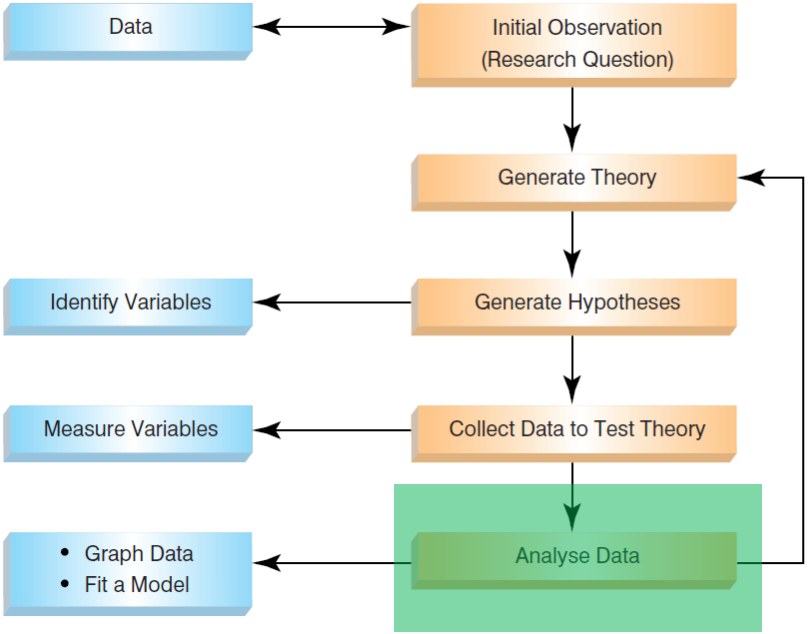


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

The research process

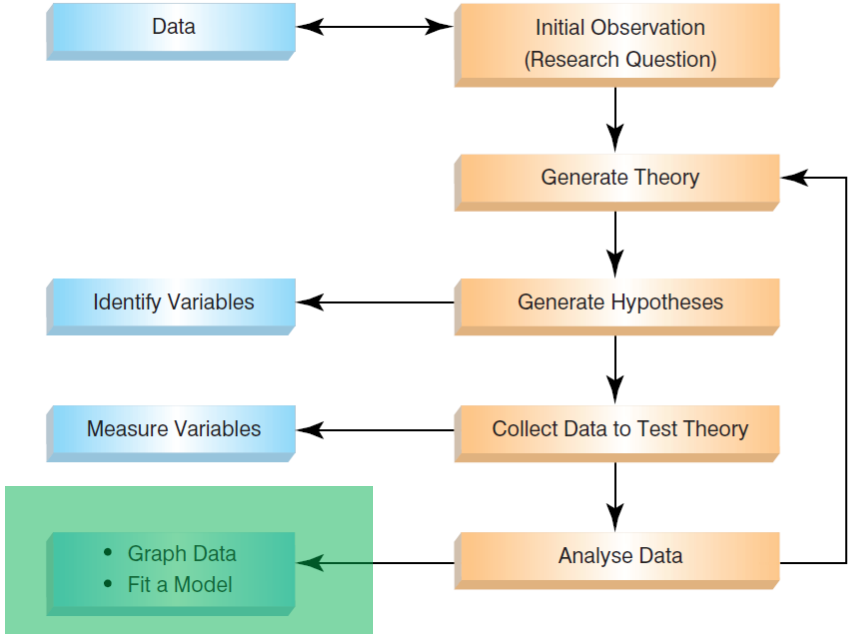


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

1. What does “doing quantitative research” mean?

The research process

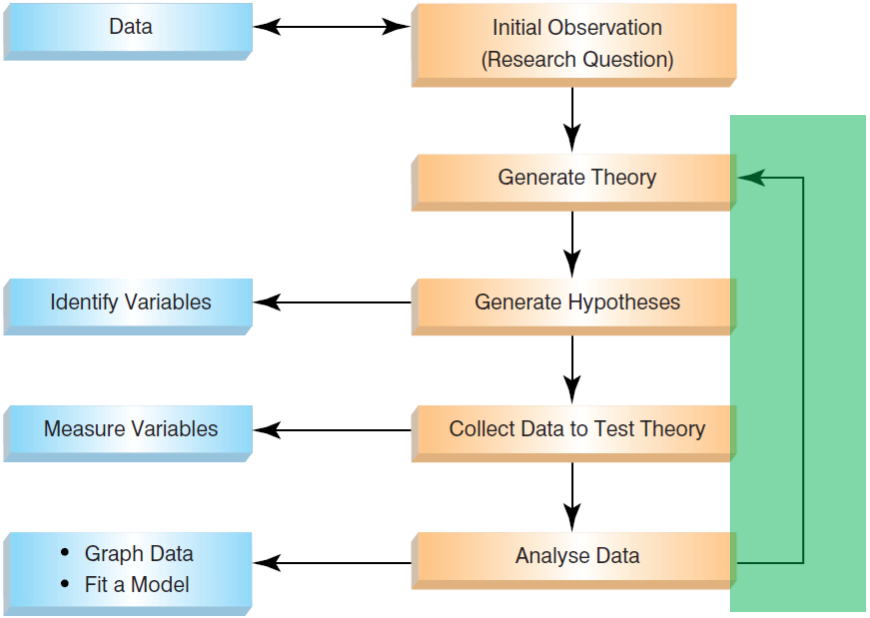


FIGURE 1.2
The research process

Source: Andy Field. 2009. *Discovering statistics using IBM SPSS Statistics* (3. edition). London, u.a.: SAGE, S. 34

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

2. What kind of questions can I answer with a quantitative research design?

2. Quantitative research questions

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

4 types of questions

1. **Descriptive questions**
   - most basic type of quantitative research question
   - seek to explain when, where, why, or how something occurred
   - data and statistics are used to describe an event or phenomenon
2. **Comparative questions**
   - are designed to help you identify clear differences between two or more groups based on one or more variables
   - are especially helpful when studying groups (independent variable) with dependent variables
3. **Relationship-based questions**
   - used to describe an association or trend between two or more variables
4. **Causal (comparative or relational) questions**
   - to determine whether one or more variables (e.g., a program or treatment variable; in comparative design: independent variable, in relational design: predictor variable) causes or affects one or more outcome variables

2. Quantitative research questions

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

4 types of questions

1. **Descriptive questions**
   - most basic type of quantitative research question
   - seek to explain when, where, why, or how something occurred
   - data and statistics are used to describe an event or phenomenon
2. **Comparative questions**
   - are designed to help you identify clear differences between two or more groups based on one or more variables
   - are especially helpful when studying groups (independent variable) with dependent variables
3. **Relationship-based questions**
   - used to describe an association or trend between two or more variables
4. **Causal (comparative or relational) questions**
   - to determine whether one or more variables (e.g., a program or treatment variable; in comparative design: independent variable, in relational design: predictor variable) causes or affects one or more outcome variables

2. Quantitative research questions

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

4 types of questions

1. **Descriptive questions**
   - most basic type of quantitative research question
   - seek to explain when, where, why, or how something occurred
   - data and statistics are used to describe an event or phenomenon
2. **Comparative questions**
   - are designed to help you identify clear differences between two or more groups based on one or more variables
   - are especially helpful when studying groups (independent variable) with dependent variables
3. **Relationship-based questions**
   - used to describe an association or trend between two or more variables
4. **Causal (comparative or relational) questions**
   - to determine whether one or more variables (e.g., a program or treatment variable; in comparative design: independent variable, in relational design: predictor variable) causes or affects one or more outcome variables

2. Quantitative research questions

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

4 types of questions

1. **Descriptive questions**
   - most basic type of quantitative research question
   - seek to explain when, where, why, or how something occurred
   - data and statistics are used to describe an event or phenomenon
2. **Comparative questions**
   - are designed to help you identify clear differences between two or more groups based on one or more variables
   - are especially helpful when studying groups (independent variable) with dependent variables
3. **Relationship-based questions**
   - used to describe an association or trend between two or more variables
4. **Causal (comparative or relational) questions**
   - to determine whether one or more variables (e.g., a program or treatment variable; in comparative design: independent variable, in relational design: predictor variable) causes or affects one or more outcome variables

2. Quantitative research questions

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

4 types of questions/ examples

1. **Descriptive questions**
   - What percentage of college students have felt depressed in the last year?
2. **Comparative questions**
   - What are the differences in attitudes towards online banking between Millennial adults and generation x people?
   - Which of two painkillers is more effective for headaches?
3. **Relationship-based questions**
   - What is the relationship between job satisfaction and salary amongst Vienna residents?
   - What is the relationship between disposable income and self-confidence amongst young adults?
4. **Causal (comparative or relational) questions**
   - Do different teaching methods affect exam performance?
   - What factors influence the salaries of professional soccer players? (causal-relational)

2. Quantitative research questions

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

4 types of questions/ examples

1. **Descriptive questions**
   - What percentage of college students have felt depressed in the last year?
2. **Comparative questions**
   - What are the differences in attitudes towards online banking between Millennial adults and generation x people?
   - Which of two painkillers is more effective for headaches?
3. **Relationship-based questions**
   - What is the relationship between job satisfaction and salary amongst Vienna residents?
   - What is the relationship between disposable income and self-confidence amongst young adults?
4. **Causal (comparative or relational) questions**
   - Do different teaching methods affect exam performance?
   - What factors influence the salaries of professional soccer players? (causal-relational)

2. Quantitative research questions

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

4 types of questions/ examples

1. **Descriptive questions**
   - What percentage of college students have felt depressed in the last year?
2. **Comparative questions**
   - What are the differences in attitudes towards online banking between Millennial adults and generation x people?
   - Which of two painkillers is more effective for headaches?
3. **Relationship-based questions**
   - What is the relationship between job satisfaction and salary amongst Vienna residents?
   - What is the relationship between disposable income and self-confidence amongst young adults?
4. **Causal (comparative or relational) questions**
   - Do different teaching methods affect exam performance?
   - What factors influence the salaries of professional soccer players? (causal-relational)

2. Quantitative research questions

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

4 types of questions/ examples

1. **Descriptive questions**
   - What percentage of college students have felt depressed in the last year?
2. **Comparative questions**
   - What are the differences in attitudes towards online banking between Millennial adults and generation x people?
   - Which of two painkillers is more effective for headaches?
3. **Relationship-based questions**
   - What is the relationship between job satisfaction and salary amongst Vienna residents?
   - What is the relationship between disposable income and self-confidence amongst young adults?
4. **Causal (comparative or relational) questions**
   - Do different teaching methods affect exam performance?
   - What factors influence the salaries of professional soccer players? (causal-relational)

2. Quantitative research questions

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Transformation from questions to hypotheses

1. **Descriptive questions**
   - More than 50% of college students have felt depressed in the last year.
2. **Comparative questions**
   - Millenial adults have different attitudes towards online banking than generation x people. (two-sided; postulated effect without direction)
   - Painkiller A is more effective for headaches than painkiller B. (one-sided; postulated effect with direction)
3. **Relationship-based questions**
   - The higher the income, the greater the job satisfaction. (one-sided; postulated effect with direction)
   - There is a relationship between disposable income and self-confidence amongst young adults. (two-sided; postulated effect without direction)
4. **Causal (comparative or relational) questions**
   - There are differences in exam performance depending upon the teaching method used. (two-sided; postulated effect without direction)
   - Age and the length of experience have positive influence on the salaries of professional soccer players. (one-sided; postulated effect with direction)

2. Quantitative research questions

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Transformation from questions to hypotheses

1. **Descriptive questions**
   - More than 50% of college students have felt depressed in the last year.
2. **Comparative questions**
   - Millenial adults have different attitudes towards online banking than generation x people. (two-sided; postulated effect without direction)
   - Painkiller A is more effective for headaches than painkiller B. (one-sided; postulated effect with direction)
3. **Relationship-based questions**
   - The higher the income, the greater the job satisfaction. (one-sided; postulated effect with direction)
   - There is a relationship between disposable income and self-confidence amongst young adults. (two-sided; postulated effect without direction)
4. **Causal (comparative or relational) questions**
   - There are differences in exam performance depending upon the teaching method used. (two-sided; postulated effect without direction)
   - Age and the length of experience have positive influence on the salaries of professional soccer players. (one-sided; postulated effect with direction)

2. Quantitative research questions

Transformation from questions to hypotheses

1. **Descriptive questions**
   - More than 50% of college students have felt depressed in the last year.
2. **Comparative questions**
   - Millenial adults have different attitudes towards online banking than generation x people. (two-sided; postulated effect without direction)
   - Painkiller A is more effective for headaches than painkiller B. (one-sided; postulated effect with direction)
3. **Relationship-based questions**
   - The higher the income, the greater the job satisfaction. (one-sided; postulated effect with direction)
   - There is a relationship between disposable income and self-confidence amongst young adults. (two-sided; postulated effect without direction)
4. **Causal (comparative or relational) questions**
   - There are differences in exam performance depending upon the teaching method used. (two-sided; postulated effect without direction)
   - Age and the length of experience have positive influence on the salaries of professional soccer players. (one-sided; postulated effect with direction)

2. Quantitative research questions

Transformation from questions to hypotheses

1. **Descriptive questions**
   - More than 50% of college students have felt depressed in the last year.
2. **Comparative questions**
   - Millenial adults have different attitudes towards online banking than generation x people. (two-sided; postulated effect without direction)
   - Painkiller A is more effective for headaches than painkiller B. (one-sided; postulated effect with direction)
3. **Relationship-based questions**
   - The higher the income, the greater the job satisfaction. (one-sided; postulated effect with direction)
   - There is a relationship between disposable income and self-confidence amongst young adults. (two-sided; postulated effect without direction)
4. **Causal (comparative or relational) questions**
   - There are differences in exam performance depending upon the teaching method used. (two-sided; postulated effect without direction)
   - Age and the length of experience have positive influence on the salaries of professional soccer players. (one-sided; postulated effect with direction)

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

3. What methods do exist when researching quantitative?

3. Quantitative research methods

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

3 most common research methods

1. Quantitative content analysis

2. Secondary data analysis

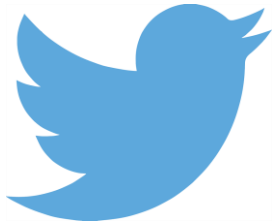
3. **Primary data collection and analysis (correlational/ experimental methods)**

3. Quantitative research methods

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

3 most common research methods/ quantitative content analysis

- Content analysis involves carefully examining artifacts that function as a medium for communication, including songs, sculptures, graphic designs, comic strips, newspaper articles, magazine advertisements, books, films, television shows, tweets, Instagram pictures, letters, and much more



3. Quantitative research methods

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

3 most common research methods/ secondary data analysis

- Secondary or archival data analysis means that you as a researcher use collected data from other researchers instead of collecting your own data

3. Quantitative research methods

3 most common research methods/ primary data collection and analysis

- Collecting primary data involves directly obtaining responses from people; researchers collect such data using a combination of survey, experimental, and observational methods

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

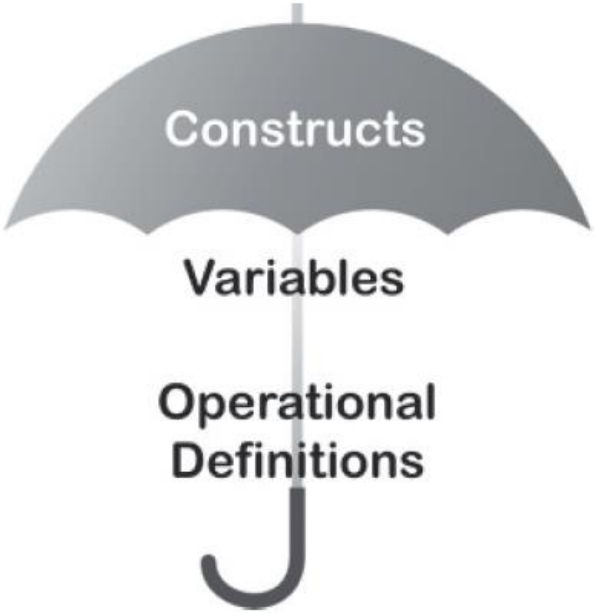
University of Applied Sciences

4. What are variables and why do I need them for my questionnaire?

Slides partly adopted from Karin Dobernig & Bostjan Zrim

4. Variables

The definitional hierarchy



4. Variables

Definition

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

- …anything that can be measured and can differ across entities or across time

- …might vary between people (e.g., IQ, behaviour) or locations (e.g., unemployment) or time (e.g., mood, profit, number of cancerous cells)

4. Variables

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

What do variables measure?

In questionnaires, variables usually measure the following:

- **Attributes** (i.e. respondent characteristics such as age, gender, education, income, etc.).

Age: _____years

4. Variables

What do variables measure?

In questionnaires, variables usually measure the following:

- **Opinion** (i.e. how respondents feel about something; what they think or believe).

Is the service you receive? (Please circle O the number)	Excellent	Good	Reasonable	Poor	Awful
	5	4	3	2	1

4. Variables

What do variables measure?

In questionnaires, variables usually measure the following:

- **Behaviour** (i.e. what respondents did in the past, do now or intend to do in the future -> self-reported behaviour)

How often do you consume soft drinks in a typical week?

□ *Less than once a week*

□ *1 to 3 times per week*

□ *4 to 6 times per week*

□ *7 or more times per week*

4. Variables

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Operationalization and the level of measurement

- Variables can take on many different forms and levels of sophistication

- **Operationalization**
  - The way in which you make a variable measurable (e.g. by asking questions in your survey and getting responses in the form of numbers)

- **Level of measurement**
  - the relationship between what is being measured and the numbers that represent what is being measured (the level of measurement depends on how you ask your questions in your survey)

4. Variables

Operationalization - example

- For quantity questions, actual numbers can be used as codes
- For other questions, a coding scheme has to be designed
- Design the coding scheme prior to collecting data and integrate it into the questionnaire.

16	Is the service you receive? (Please circle O the number)	Excellent 5	Good 4	Reasonable 3	Poor 2	Awful 1

4. Variables

Level of measurement/ 2 general types of variables

- Variables can be split into categorical and continous, and within these types there are different levels of measurement

1. Categorical = entities are divided into distinct categories

2. Continuous = entities get a distinct score

4. Variables

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Level of measurement/ categorical variables

- There are various forms of categorical variables:
  - **Binary variable**: There are only two categories (e.g., dead or alive; male or female)
  - **Nominal variable**: There are more than two categories (e.g., whether someone is an ominvore, vegetarian, vegan, or fruitarian)
- The values of binary and nominal variables have no numeric meaning as no mathematical operation except counting can be done on the data

4. Variables

Level of measurement/ categorical variables

- There are various forms of categorical variables:
    - **Ordinal variable**: The same as nominal variable but the categories have a logical order (e.g., whether people buy 0-1 softdrink, 2-3 softdrinks or 4-more softdrinks per week)
- In the case of ordinal variables, only certain mathematical variables such as greater than or less than are feasible and only statistical parameters such as median and range can be calculated additionally to counting

4. Variables

Level of measurement/ continuous variables

- Forms of continuous variables:
    - **Interval variable**: Equal intervals on the variable represent equal differences in the property being measured (e.g., the difference between 6 and 8 is equivalent to the difference between 13 and 15)
- Interval variables provide more flexibility in terms of measurement as it not only allows us to rank the measured items but can also help in quantifying the size of the difference between them; Additional allowed mathematical operations: addition and subtraction

4. Variables

Level of measurement/ continuous variables

- Forms of continuous variables:
    - **Ratio variable**: The same as an interval variable, but the ratios of scores on the scale must also make sense (e.g., a score of 16 on an anxiety scale means that the person is, in reality, twice as anxious as someone scoring 8); for this to be true, the scale must have a meaningful zero point
- Additional allowed mathematical operations: multiplication and division

4. Variables

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Identify the variables on which you want to collect data.
Future analysis (explanatory research): you need to be clear about which relationships you think are likely to exist between variables (e.g. which are the dependent and independent variables).
Establish the level of detail required from the data for each variable (e.g. age or age groups).
If you are unsure about the detail needed you should measure at precise level (e.g. age instead of age group).

Example:
Age: ____years
Age: □ below 20 years □ 20-29 years □ 20-39 years □ 40-49 years □ 50 and above

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

5. How do I design a quantitative questionnaire?

Most slides adopted from Karin Dobernig & Bostjan Zrim

5. Questionnaire design

When to Use Questionnaires

Questionnaires tend to be used for:

- **descriptive** research (i.e. describe the population's characteristics, including variability and distribution) or
- **explanatory** research (i.e. examine and explain relationships between variables)

5. Questionnaire design

Order of questions/ questionnaire structure

Opening statement:

Research purpose/question

Anonymity

Author/contact information

The **opening questions:**

- should be interesting, simple, and non-threatening.
- Are more straightforward and ones the respondent will enjoy answering.
- Questions about attributes and behaviours are usually more straightforward to answer than those collecting data on opinions.

Middle of the questionnaire: questions and topics that are more complex.

Towards the end of your questionnaire:

- Personal, embarrassing and sensitive questions.
- A respondent may refuse to answer; however, if they are at the end of an interviewer-completed questionnaire you will still have the rest of the data.

In general, questions should be grouped into obvious sections that make sense to the respondent.

5. Questionnaire design

Order of questions/ questionnaire structure

Opening statement:

Research purpose/question

Anonymity

Author/contact information

The **opening questions:**

- should be interesting, simple, and non-threatening.
- Are more straightforward and ones the respondent will enjoy answering.
- Questions about attributes and behaviours are usually more straightforward to answer than those collecting data on opinions.

Middle of the questionnaire: questions and topics that are more complex.

Towards the end of your questionnaire:

- Personal, embarrassing and sensitive questions.
- A respondent may refuse to answer; however, if they are at the end of an interviewer-completed questionnaire you will still have the rest of the data.

In general, questions should be grouped into obvious sections that make sense to the respondent.

5. Questionnaire design

Order of questions/ questionnaire structure

Opening statement:

- Research purpose/question
- Anonymity
- Author/contact information

The **opening questions:**

- should be interesting, simple, and non-threatening.
- Are more straightforward and ones the respondent will enjoy answering.
- Questions about attributes and behaviours are usually more straightforward to answer than those collecting data on opinions.

Middle of the questionnaire: questions and topics that are more complex.

Towards the end of your questionnaire:

- Personal, embarrassing and sensitive questions.
- A respondent may refuse to answer; however, if they are at the end of an interviewer-completed questionnaire you will still have the rest of the data.

In general, questions should be grouped into obvious sections that make sense to the respondent.

5. Questionnaire design

Order of questions/ questionnaire structure

Opening statement:

- Research purpose/question
- Anonymity
- Author/contact information

The **opening questions:**

- should be interesting, simple, and non-threatening.
- Are more straightforward and ones the respondent will enjoy answering.
- Questions about attributes and behaviours are usually more straightforward to answer than those collecting data on opinions.

Middle of the questionnaire: questions and topics that are more complex.

Towards the end of your questionnaire:

- Personal, embarrassing and sensitive questions.
- A respondent may refuse to answer; however, if they are at the end of an interviewer-completed questionnaire you will still have the rest of the data.

In general, questions should be grouped into obvious sections that make sense to the respondent.

5. Questionnaire design

Question writing

- Use language that is easily understood.
- Avoid technical terms and jargon.
- Consider the level of knowledge of the respondents.
- Can the respondents remember?
- ……

5. Questionnaire design

Question writing

Can the respondent remember?

How many gallons of soft drinks did you consume during the last four weeks? *(Incorrect)*

How often do you consume soft drinks in a typical week? *(Correct)*

□ *Less than once a week*

□ *1 to 3 times per week*

□ *4 to 6 times per week*

□ *7 or more times per week*

5. Questionnaire design

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Question writing

Provide a timeframe.

Avoid:	How much do you usually spend on groceries?
Use:	In the past week, about how much did you spend on groceries?

Avoid:	In the past year, how much did you spend on groceries?
Use:	In the past week, about how much did you spend on groceries?

5. Questionnaire design

Question writing

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Beware of leading questions:

Avoid:	Does our excellent new online shopping service make your life more convenient?
Use:	How do you feel about our new online shopping service?

5. Questionnaire design

Question writing

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Only ask ONE question at the time:

Avoid:	Do you eat healthy foods and exercise every day?
Use:	In the past seven days, how many days did you exercise? In the past seven days, how many days did you eat healthy foods?

5. Qualtrics

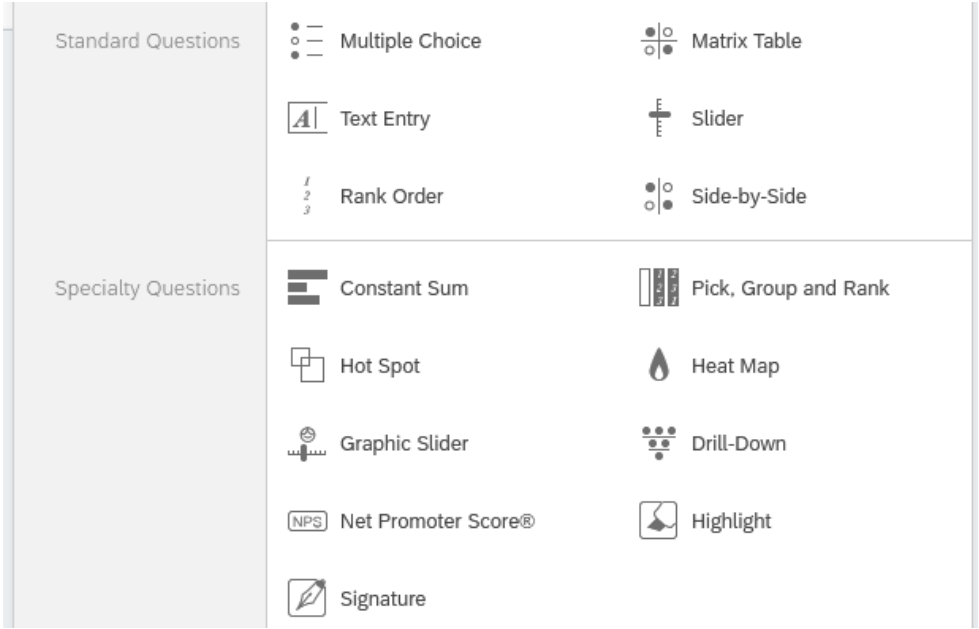
Online tool for quantitative research

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

fhwn.qualtrics.com

5. Questionnaire design

Question types



5. Single choice

Example

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

5. Multiple Choice

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Example

Which of the following sports have you ever tried? (Tick all that apply)

☐ Squash	☐ Skiing	☐ Tennis
☐ Sailing	☐ Surfing	☐ Waterskiing
☐ Snowboarding	☐ Horseback-riding	☐ Others: _____

In order to avoid misunterstandings, all multiple responses should be marked with the phrase "Tick all that apply" or "Check all that apply".

5. Text entry

Example

6 Please list up to three things you like about your job:

1 .....

2 .....

3 .....

5. Rank order

Example

A ranking question: asks the respondent to place things in rank order.

We can discover their relative importance to the respondent

Please number each of the factors listed below in order of importance to you in your choice of a new car. Number the most important 1, the next 2 and so on. If a factor has no importance at all, please leave blank.

Factor	*Importance*
Carbon dioxide emissions	[ ]
Boot size	[ ]
Depreciation	[ ]
Safety features	[ ]
Fuel economy	[ ]
Price	[ ]
Driving enjoyment	[ ]
Other	[ ]
.....	(⇐ Please describe)

5. Matrix question

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Example

A matrix question: covers two or more similar questions at the same time

1. How satisfied or dissatisfied are you with each of the following?

	1 - Very satisfied	2 - Somewhat satisfied	3 - Neither satisfied nor dissatisfied	4 - Somewhat dissatisfied	5 - Very dissatisfied	N/A
The interaction with the sales staff	○	○	○	○	○	○
Your experience at the register	○	○	○	○	○	○
The organization of the store	○	○	○	○	○	○
The products offered in the store	○	○	○	○	○	○
The price of the products	○	○	○	○	○	○
The sizes available at the store	○	○	○	○	○	○

5. Side by Side

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Example

Education:

	highest completed	currently enrolled
Compulsory Ed.	☐	☐
(Apprenticeship)	☐	☐
High School	☐	☐
College/Bachelor	☐	☐
College/Master	☐	☐
Doctorate	☐	☐

5. Filter questions

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Example

Filter questions identify those respondents for whom the following question or questions are not applicable, so they can skip those questions.

19	Are you currently registered as unemployed?	Yes	❑1
	If 'no' go to question 25	No	❑2
20	How long have you been registered as unemployed?	☐☐ years	☐☐ months

5. Questionnaire design

Scales

Two Definitions

= **Set of questions** measuring a particular phenomenon
(e.g. Work-Life-Balance-Scale)

= Set of **answer options**
(… on a scale from 1=strongly agree to 7=strongly disagree)

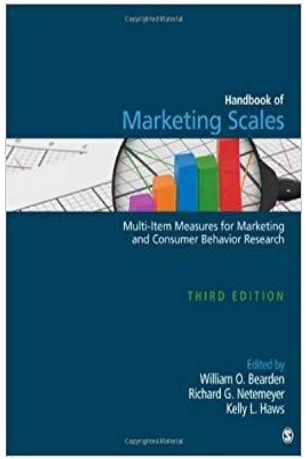
Likert-Scale

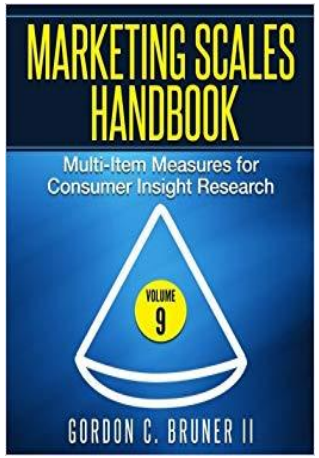
5. Questionnaire design

Scales

Use established scales!

Refer to scales handbooks or previously published studies in scientific journals.





5. Questionnaire design

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Scales: Answer options

Decide on Number of Options:

- 4-point scale:

  very satisfied – rather satisfied – rather dissatisfied – very dissatisfied

- 5-point scale:

  very satisfied – rather satisfied – neutral – rather dissatisfied – very dissatisfied

7- and 10-point scales are also frequently used.

Use common wording…

5. Questionnaire design

Scales: Answer options

A. I think the president has been doing a wonderful job while in office.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐
1	2	3	4	5

B. I feel safe walking alone in my neighborhood at night.

Completely Agree	Mostly Agree	Somewhat Agree	Somewhat Disagree	Mostly Disagree	Completely Disagree
☐	☐	☐	☐	☐	☐

C. How satisfied or dissatisfied are you with the reliability of this product?

Very Satisfied	Somewhat Satisfied	Neither Satisfied nor Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied
☐	☐	☐	☐	☐
1	2	3	4	5

5. Questionnaire design

Scales: Answer options

D. Compared with adults in general, how would you rate your own health?

Excellent	Very Good	Good	Fair	Poor	Very Poor
☐	☐	☐	☐	☐	☐
1	2	3	4	5	6

E. When you drink coffee, how frequently do you choose to drink decaf coffee?

Never	Rarely	Occasionally	Often	Nearly Always
☐	☐	☐	☐	☐
1	2	3	4	5

F. Choose the one box along the continuum between each pair of antonyms that best describes how you view the service representative who assisted you.

Rude	1	2	3	4	5	6	7	Polite
Intelligent	1	2	3	4	5	6	7	Stupid

Source: Lavrakas, Paul (Ed.) 2008. Encyclopedia of Survey Research Methods. Vol. 1, Los Angeles: Sage.

5. Questionnaire design

Scales: Answer options

Table 11.3 Response categories for different types of rating questions

Type of rating	Five categories	Seven categories
Agreement	Strongly agree	Strongly agree
	Agree	Agree/moderately agree/mostly agree*
	Neither agree nor disagree/not sure/uncertain*	Slightly agree
	Disagree	Neither agree nor disagree/not sure/ uncertain*
	Strongly disagree	Slightly disagree
		Disagree/moderately disagree/ mostly disagree*
		Strongly disagree

5. Questionnaire design

Scales: Answer options

Amount	Far too much/nearly all/very large*	Far too much/nearly all/very large*
	Too much/more than half/ large*	Too much/more than half/large*
	About right/about half/some*	Slightly too much/quite large*
	Too little/less than half/small*	About right/about half/some*
	Far too little/almost none/not at all*	Slightly too little/quite small*
		Too little/less than half/small*
		Far too little/almost none/not at all*

5. Questionnaire design

Scales: Answer options

Frequency	All the time/always*	All the time/always*
	Frequently/very often/most of the time*	Almost all the time/almost always*
	Sometimes/about as often as not/about half the time*	Frequently/very often/most of the time*
	Rarely/seldom/less than half the time*	Sometimes/about as often as not/ about half the time*
	Never/practically never*	Seldom
		Almost never/practically never*
		Never/not at all*

5. Questionnaire design

Scales: Answer options

Likelihood	Very	Extremely
	Good	Very
	Reasonable	Moderately
	Slight/bit*	Quite/reasonable*
	None/not at all*	Somewhat
		Slight/bit*
		None/not at all*

*Response dependent on question.

Source: Developed from Tharenou et al. (2007) and authors' experience

Source: Saunders et al. 2016. Research Methods for Business Students. Seventh Edition. Edinburgh Gate: Pearson.

5. Questionnaire design

Question coding

–For quantity questions, actual numbers can be used as codes

–For other questions, a coding scheme has to be designed

–Design the coding scheme prior to collecting data and integrate it into the questionnaire.

16	Is the service you receive? (Please circle O the number)	Excellent 5	Good 4	Reasonable 3	Poor 2	Awful 1

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

6. How do I define my sampling method?

6. Population and sample

Definitions

Sampling methods?
Sample size?

6. Sampling methods

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

2 types

- Sampling can be defined as the process or technique of selecting a suitable sample, representative of the population from which it is taken, for the purpose of determining parameters or characteristics of the whole population

- There are two types of sampling

1. probability sampling
2. nonprobability sampling

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

2 types

- There are two types of sampling

1. probability sampling
2. nonprobability sampling

- Researchers prefer probabilistic sampling methods over non-probabilistic ones due to constraints such as time and cost and objectives of the research study there are circumstances when it is not feasible to adopt a random process of selection
- **in most cases (and also will be in your case!) non-probabilistic sampling is used**

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Probability sampling

- …defined as a method of sampling that utilizes some form of random selection

- Different forms:
  - Simple Random Sampling
  - Systematic Random Sampling
  - Stratified Random Sampling
  - Cluster Sampling

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

Probability sampling/ simple random sampling

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

- …involves researchers to select a sample at random from the sampling frame using either random number table manually or on computer, or by an online number generator

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

Probability sampling/ systematic random sampling

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

- …researchers begin sampling with a random selection of an element in the range of 1 to k and then every k^{th} element in the population is selected

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

Probability sampling/ stratified random sampling

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

- …involves process of stratification (different strata are made on the bases of different factors such as life stages, income levels, management level etc.) and a random sample is then drawn from each stratum; additionally, a stratum is homogenous from within but heterogeneous with other strata

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

Probability sampling/ cluster sampling

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

- …population is divided into clusters (a cluster is a natural aggregation of elements in a population) and then randomly some clusters are drawn from the group; in a selected cluster, all elements may be selected for study or a random sample can be further drawn from the cluster

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Non-probability sampling

- …does not involve the process of random selection, that is the probability of selection of each sampling unit is not known

  - Convenience Sampling
  - Judgment Sampling
  - Quota Sampling
  - Snowball Sampling

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

Non-probability sampling/ convenience sampling

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

- …a sample of units or people is obtained, who are most conveniently available (e.g. you arbitrarily spread out your questionnaire on various platforms and everyone who fulfills the criteria to take part in the survey is invited to participate)

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

Non-probability sampling/ judgment sampling

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

- …requires researchers to use their personal judgment to select cases that they think will best answer their research questions and meet their research objectives

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

Non-probability sampling/ quota sampling

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

- …is a sort of stratified sampling but here, the selection of cases within strata is purely non-random

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sampling methods

Non-probability sampling/ snowball/chain sampling

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

- …where one or few people are initially sampled and then the sample spreads out on the basis of links that the initial people will share with further potential participants

Khalid, Khawaja, Haim Hilman, and Dileep Kumar. 2012. "Get Along with Quantitative Research Process." *International Journal of Research in Management* 2(2), 15-29, pp. 20-21

6. Sample size

FACHHOCHSCHULE WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

How large should my sample be?

- Regarding determining the necessary sample size, it usually would depend on various assumptions and parameters to consider, for instance…
  - the assumed size of the effect to be found (small, medium, large)
  - the statistical procedure which you intend to use for analysis (correlation, analysis of variance, and so on…)
  - the alpha-level, that is the probability of making a Type I error (usually this value is 0.05); Type I error = occurs when we believe that there is a genuine effect in our population, when in fact there is not
  - the power of your used test (ability to detect an effect of a particular size)
  - the number of groups in your test design
  - …

6. Sample size

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

How large should my sample be?

- Apart from the prior mentioned list, our general advice regarding your group task is:

Have as large a sample as possible!

We recommend a bare minimum of 50 participants

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

8. What happens next?

8. What happens next?

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education
University of Applied Sciences

Group Session

- You'll have a group session with your „group leader".

- There you'll
  - discuss an example of a quantitative research report.
  - get explained what information should be included in a quantitative research proposal
  - get detailed instructions for your group task.
  - get all the materials for your assignment.
  - have the possibility to ask any open questions.

FACHHOCHSCHULE
WIENER NEUSTADT
Austrian Network for Higher Education

University of Applied Sciences

Good Luck & Have Fun!

Questions?

- ✓ Group 1: Melanie Hense, BA → hense@fhwn.ac.at *(Course Leader)*
- ✓ Group 2: Mag. Severin Maurer, BA → severin.maurer@fhwn.ac.at
- ✓ Group 3: Mag. Dr. Marion Totter, MSc → marionchristine.totter@fhwn.ac.at