CPT208 Human-Centric Computing

11. Field Study and Analytics

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Knowledge check

What situation is more likely to have these types of questions?
A. Questionnaire   B. Interview

1. Overall, I found this module a valuable learning experience.

            1   2   3   4   5

    Strongly disagree   Strongly agree
2. Please write your comments/suggestions for the **module** here:

    _____

    _____

Knowledge check

What situation is more likely to have these types of questions?

A. Questionnaire   B. Interview

1. From 1 not valuable at all to 5 very valuable, how would you rate your learning experience of this module?
2. Do you have any suggestions or comments to the module? Can you tell me about it?

Knowledge check

What type of question is it?

A. Quantitative   B. Qualitative
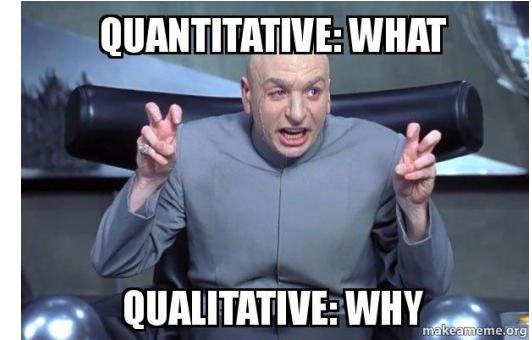
1. Overall, I found this module a valuable learning experience.
   Strongly disagree   1   2   3   4   5   Strongly agree
2. Please write your comments/suggestions for the **module** here:
   _____
   _____
3. From 1 not valuable at all to 5 very valuable, how would you rate your learning experience of this module?
4. Do you have any suggestions or comments to the module? Can you tell me about it?

Knowledge check

What type of analysis is it?

A. Quantitative   B. Qualitative

1. Overall, I found this module a valuable learning experience (M=4.10, SD=1.00).
2. "*lecture should remind of more about what are on the final*".
3. An analysis of the open-ended question showed that students are concerned about the assessments (N=11). In particular, they want to know exam content to be highlighted (N=5) and the group workload to be reduced (N=4).

Lecture Syllabus
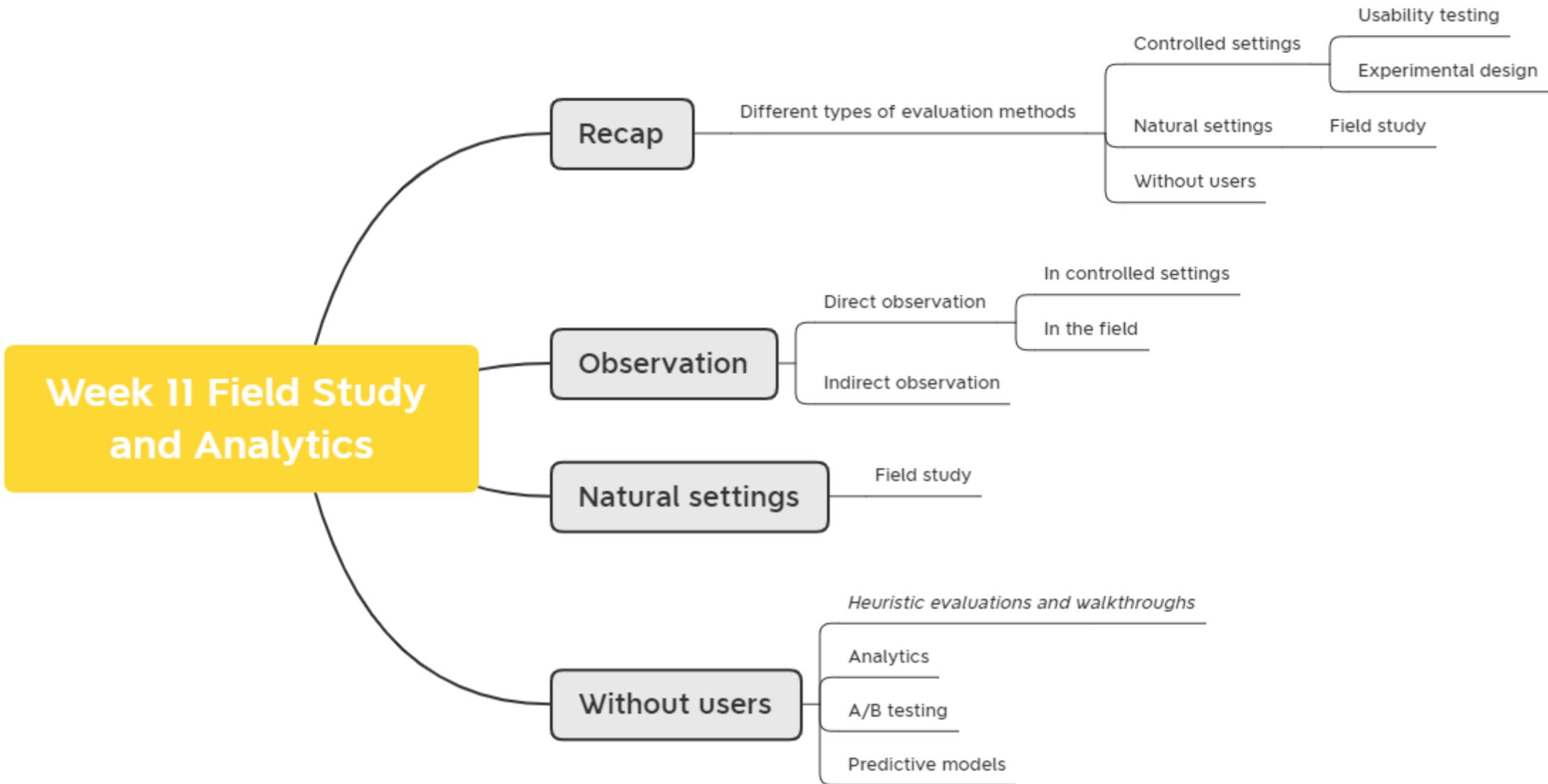
1. Introduction
2. Discovering requirements
3. Conceptual Prototyping and Practical Guide
4. Design Principles and Design Alternatives
5. Heuristic Evaluation, Questionnaire, and interview
6. Prototyping Fidelity and Dimensions
7. *SAT reading week*
8. *Group Project Demonstration Day*
9. Usability Testing & Experimental Design
10. Interfaces and Research Considerations
11. Field Study and Analytics
12. Flipped Classroom: Selected Coursework Demonstration
13. Revision

Learning Outcomes

1. To plan and carry out an observation
2. Understand the use of a field study
3. Explain the role of analytics in evaluation
4. Describe how A/B testing is used in evaluation
5. Understand the use of predictive models

This lecture is based on **Chapter 16** of the ID book.

Week 11 Field Study and Analytics

- Recap
  - Different types of evaluation methods
    - Controlled settings
      - Usability testing
      - Experimental design
    - Natural settings — Field study
    - Without users
- Observation
  - Direct observation
    - In controlled settings
    - In the field
  - Indirect observation
- Natural settings — Field study
- Without users
  - Heuristic evaluations and walkthroughs
  - Analytics
  - A/B testing
  - Predictive models

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Recap: Evaluation methods examples

Method	Controlled settings	Natural settings	Without users
Examples	✓ Usability testing ✓ Experimental design	✓ Field study	✓ Heuristic evaluation ✓ Analytics ✓ A/B testing ✓ Predictive models

Observations

Chapter 8

Observation types

➜ Direct observation
  → In the field
  → In controlled environments
➜ Indirect observation: tracking users' activities
  → Diaries
  → Interaction logging
  → Video and photographs collected remotely by drones or other equipment

Direct observation in the field

➔ Three easy-to-remember parts:
  → The person: Who?
  → The place: Where?
  → The thing: What?

AN EXCELLENT FARMER IS OUTSTANDING IN HIS FIELD!

A detailed framework (Robson, 2014) to guide observation

➜ Space: What is the physical space like and how is it laid out?

➜ Actors: What are the names and relevant details of the people involved?

➜ Activities: What are the actors doing and why?

➜ Objects: What physical objects are present, such as furniture?

➜ Acts: What are specific individual actions?

➜ Events: Is what you observe part of a special event?

➜ Time: What is the sequence of events?

➜ Goals: What are the actors trying to accomplish?

➜ Feelings: What is the mood of the group and of individuals?

Direct observation in the field
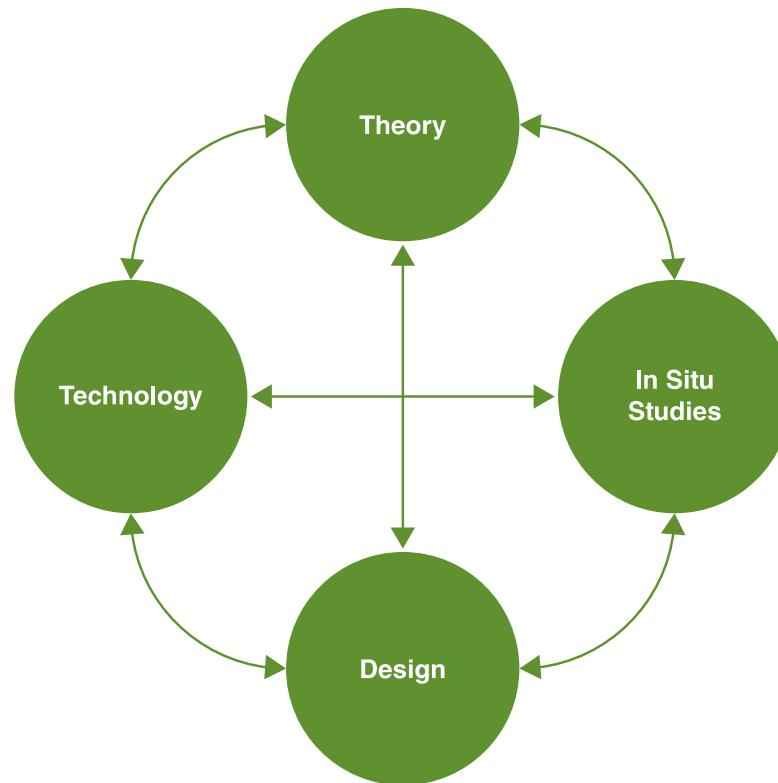
➜ Decide on how involved you will be
  → from passive observer to active participant
➜ How to gain acceptance
➜ How to handle sensitive topics, for example, culture, private spaces, and so on
➜ How to collect the data:
  → What data to collect
  → What equipment to use
  → When to stop observing

Research in the wild

How would you conduct an **in-situ study** in your project?

Optional reading:
Tennent, P., Martindale, S., Benford, S., Darzentas, D., Brundell, P., & Collishaw, M. (2020). Thresholds: Embedding Virtual Reality in the Museum. Journal on Computing and Cultural Heritage, 13(2), https://doi.org/10.1145/3369394


Source: Rogers and Marshall, 2017, p6.
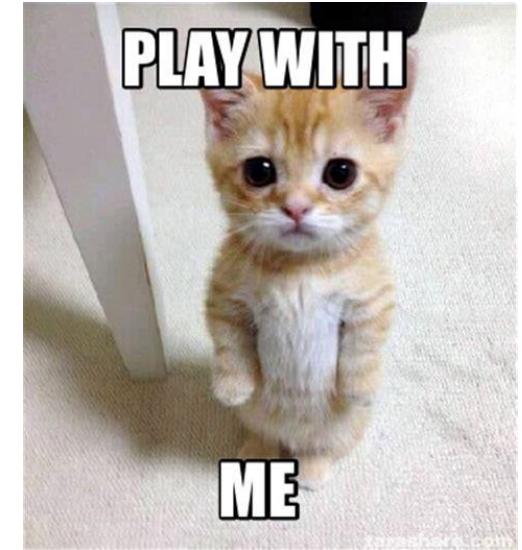
Ethnography 民族志

➔ Ethnography is a philosophy with a set of techniques that include participant observation and interviews
➔ Ethnographers immerse themselves in the culture that they study
➔ Participation is the key
➔ **Richer and more detailed** than other methods, but expensive and challenging

More on Ethnography

➔ Co-operation of people being observed is required
➔ Informants are useful
➔ Data analysis is continuous
➔ Questions get refined as understanding grows
➔ Reports usually contain examples

Online Ethnography

➔ Virtual, Online, Netnography
➔ Online and offline activity
➔ Interaction online differs from face-to-face
➔ Virtual worlds have a persistence that physical worlds do not have
➔ Ethical considerations and presentation of results are different

social media personality vs my actual personality

Observations and materials that might be collected (Crabtree, 2003)

➔ Activity or job descriptions
➔ Rules and procedures that govern particular activities
➔ Descriptions of activities observed
➔ Recordings of the talk taking place between parties
➔ Informal interviews with participants explaining the detail of observed activities
➔ Diagrams of the physical layout, including the position of artifacts

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Observations and materials that might be collected (Crabtree, 2003)

➔ Other information collected when observing activities:
  → **Photographs** of artifacts (documents, diagrams, forms, computers, and so forth)
  → **Videos** of artifacts
  → **Descriptions** of artifacts
  → **Workflow diagrams** showing the sequential order of tasks
  → **Process maps** showing connections between activities

Direct observation in a controlled environment

→ **Think aloud** techniques

"I'm typing in www.lycos.com, as you told me." <types>
"Now I am typing **child's phone** *and then clicking the search button.*
<pause and silence>
"It's taking a few seconds to respond."
"Oh! Now I have a choice of other websites to go to. Hmm, I wonder which one I should select. Well, it's for a young child so I want a 'child-safe phone.' This one mentions safe phones <He clicks on 7 Best Cell Phones for Kids - Mashable>
"Gosh, there's a lot more models to select from than I expected! Hmm, some of these are for older children. I wonder what I do next to find one for a 10-year-old."
*<pauses and looks at the screen>*
I guess I should scroll through them and identify those that might be appropriate."
<silence . . . >
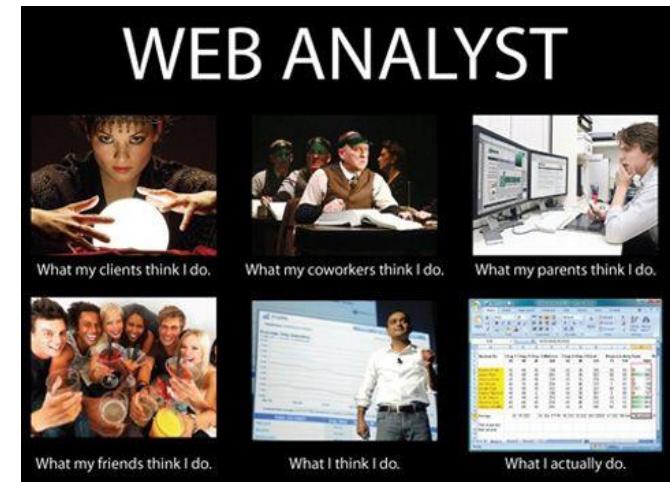
Indirect observation

➔ Tracking users' activities
  ⇢ Diaries
  ⇢ Interaction logs
  ⇢ Web analytics
➔ Video, audio, photos, and notes are used to capture data in both direct and indirect observations

Example: train ticket purchasing

➔ How will you design a study to understand users' train ticket purchasing experience using observations?
  → 12306?
  → In the train station?

Field study

Chapter 15

Field study

➔ Field studies are done in natural settings
➔ "In the wild" is a term for prototypes being used freely in natural settings
➔ Seek to understand what users do naturally and how technology impacts them
➔ Field studies are used in product design to:
  → Identify opportunities for new technology
  → Determine design requirements
  → Decide how best to introduce new technology
  → Evaluate technology in use

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Field study example: Painpad

➔ Monitoring patients' pain is a known challenge for physicians
➔ Painpad is a keypad device
➔ It was **usability tested extensively** in the lab before brought into two hospitals
➔ Goal was *to understand how Painpad was used in the natural environment and as part of routines in two UK hospitals.*

Price et al., 2018

Data collection and participants

➜ Two studies in two hospitals
  ⇢ Involving 54 people (13 males, 41 females)
  ⇢ Hospital stay ranged from 1-7 days, with a mean stay of 2-3 days
  ⇢ Aged between 32-88, mean and median age 64.6, 64.5
➜ Patients given Painpad after surgery and prompted to report pain levels every two hours, nurses also collected scores
➜ Patients in one hospital were given a user-satisfaction survey when they left
➜ Also rated Painpad on a 1-5 Likert scale
  ⇢ Privacy was a important concern
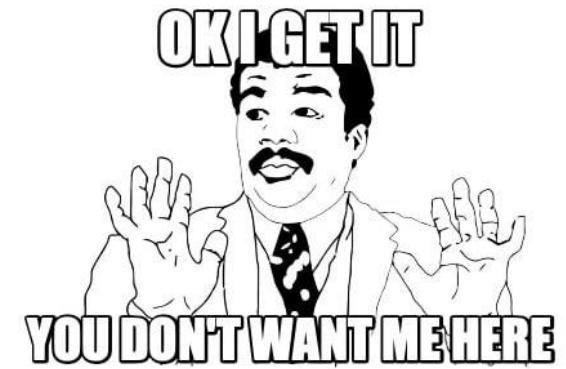
Data analysis and presentation

➔ Three types of data were collected:
  → *Satisfaction* with Painpad was based on ***questionnaire*** responses
  → Patients' *compliance* with the two-hour routine
  → How data collected from *Painpad* compared with data collected by *nurses*
➔ Data showed:
  → *Satisfaction* with Painpad 4.63 on Likert scale
  → Patience *compliance* was mixed: some liked it while others disliked or didn't notice the prompts
  → Patients recorded *more scores with Painpad* than through the *nurses*

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Without users?

More precisely, **without** direct involvement **of users.**

➜ Experts knowledge codified in heuristics
  → Heuristic evaluation
  → Walkthroughs
➜ Data collected remotely
  → Analytics
  → A/B testing
➜ Models that predict users' performance
  → Predictive modeling

OK I GET IT
YOU DON'T WANT ME HERE

Analytics

Chapter 16

Analytics

➔ A variety of users' actions can be recorded by software automatically
  → Key presses
  → Mouse or other pointing device movements
  → Time spent searching a web page, looking at help systems
  → Task flow through software modules
  → Screen time
 → Movement in a virtual environment
  → ...
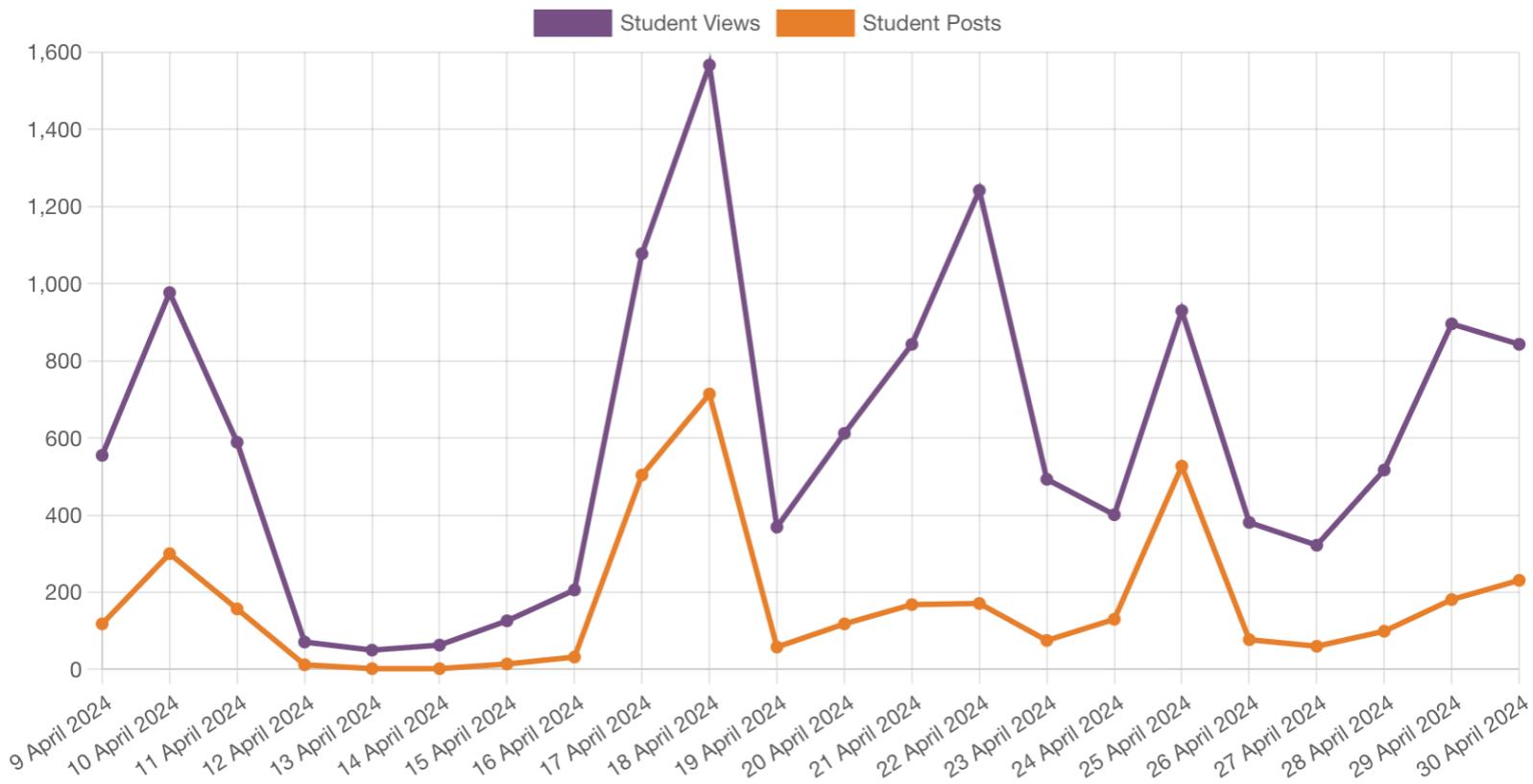
Analytics

➔ Advantages of logging activity automatically
　→ It is unobtrusive provided the system's performance is not affected
　→ Large volumes of data can be logged automatically and then explored and analyzed using visualization and other tools.
➔ Disadvantage
　→ It raises ethical concerns about observing participants if this is done without their knowledge
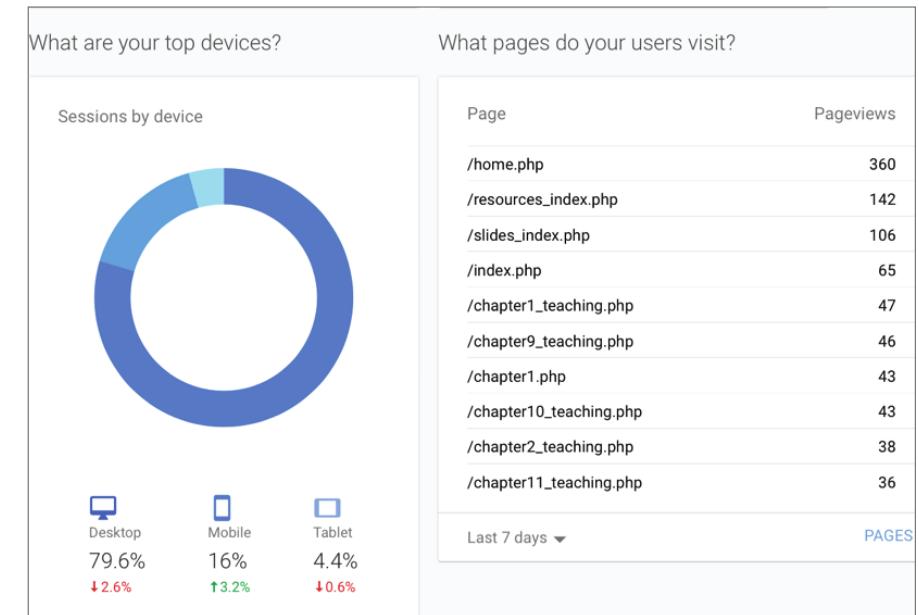
# Web Analytics

➔ A form of interaction logging that analyses users' activities on website
➔ Designers use the analysis to improve their designs
    → When designs don't meet users' needs, they will not return to the site, they become one-time users
➔ Enable designers to track the activities of users on their site
    → How many people come to the site, how long they stay, and where they go
➔ Offer designers the "big picture" about how their site performs based on user activity

Example: CPT208 learning mall

Example: id-book.com

Segment of Google Analytics for Interaction Design 5e website, December 2018

Example: id-book.com

Language	Acquisition			Behavior		
	Users ↓	New Users	Sessions	Bounce Rate	Pages / Session	Avg. Session Duration
	529 % of Total: 100.00% (529)	462 % of Total: 100.22% (461)	642 % of Total: 100.00% (642)	60.28% Avg for View: 60.28% (0.00%)	3.26 Avg for View: 3.26 (0.00%)	00:02:31 Avg for View: 00:02:31 (0.00%)
1. en-us	317 (59.81%)	279 (60.39%)	391 (60.90%)	55.50%	3.80	00:03:02
2. en-gb	44 (8.30%)	34 (7.36%)	52 (8.10%)	63.46%	2.44	00:01:21
3. zh-cn	27 (5.09%)	21 (4.55%)	35 (5.45%)	82.86%	2.40	00:01:31
4. es-es	12 (2.26%)	11 (2.38%)	13 (2.02%)	61.54%	2.08	00:00:32
5. sv-se	11 (2.08%)	9 (1.95%)	13 (2.02%)	69.23%	1.46	00:01:36
6. ko-kr	9 (1.70%)	9 (1.95%)	14 (2.18%)	35.71%	6.29	00:04:10
7. de-de	6 (1.13%)	6 (1.30%)	6 (0.93%)	66.67%	3.33	00:00:25
8. en	6 (1.13%)	6 (1.30%)	6 (0.93%)	83.33%	1.17	00:00:06
9. ar	5 (0.94%)	3 (0.65%)	6 (0.93%)	66.67%	4.17	00:01:00
10. nl-nl	5 (0.94%)	5 (1.08%)	5 (0.78%)	40.00%	2.80	00:01:02

Segment of Google Analytics for Interaction Design 5e website, December 2018

Example: Make sense of the analytics

1. **How many people** visited the site during this period?
2. What do you think someone might **look at** in 2 minutes, 37 seconds (the average time they spent on the site)?
3. *Bounce rate* refers to the percentage of visitors who view just one page of your site. **What is the bounce rate for this book**, and why do you think this might be a useful metric to capture for any website?
4. **Which devices** are being used to access the site?
5. Which were the **three largest language groups** during the period, and what can you say about the **bounce rate** for each of them?

Other Analytics Tools
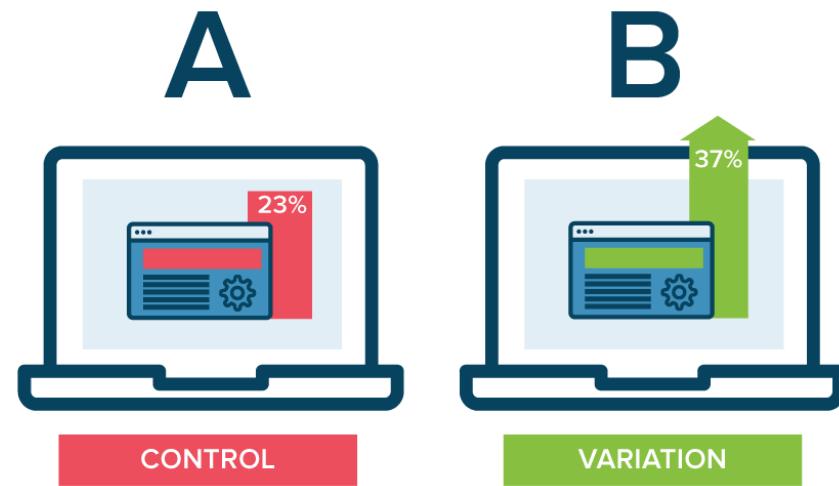
➔ **Moz Analytics** Tracks search marketing, social media marketing, brand activity, links, and content marketing, and it is particularly useful for link management and analysis: www.moz.com

➔ **TruSocialMetrics** Tracks social media metrics, and it helps calculate social media marketing return on investment: www.truesocialmetrics.com

➔ **Clicky** Comprehensive and real-time analytics tool that shows individual visitors and the actions they take, and it helps define what people from different demographics find interesting: www.clicky.com

➔ **KISSmetrics** Detailed analytics tool that displays what website visitors are doing on your website before, during, and after they buy: www.kissmetrics.com

➔ **Crazy Egg** Tracks visitor clicks based on where they are specifically clicking, and it creates click heat maps useful for website design, usability, and conversion: www.crazyegg.com

➔ **ClickTale** Records website visitor actions and uses meta-statistics to create visual heat map reports on customer mouse movement, scrolling, and other visitor behaviors: www.clicktale.com

A/B Testing

Chapter 16

A/B Testing

➔ A large-scale experiment (thousands of participants or more)

➔ Offers another way to evaluate a website, application of app running on a mobile device

➔ Often used for evaluating changes in design on social media applications

➔ Compares how two groups of users perform on two versions of a design

➔ May create ethical dilemmas if users don't know they are part of the test

A

B

23%

37%

CONTROL

VARIATION

Example: Learning Mall login page

1. What is the independent variable?
2. What is the dependent variable?
3. Do you have a hypothesis?
4. Is it a within-subjects design or between-subjects design?
5. How will you deal with ethical issues?

Existing design

New design

Example: Video Cover & Title
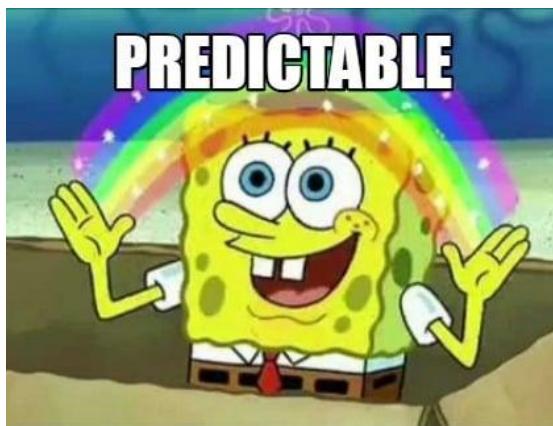
→ 【何同学】为了找到流量密码，我们做了个假B站...
  https://www.bilibili.com/video/BV1AP411d7Qa/
  → Prototyping + A/B testing

→ Same topic but using a different approach
  → 【-LKs-】38位UP主，谁是起标题&封面之王?
    https://www.bilibili.com/video/BV18G4y1s7A9
  → Prototyping + questionnaire evaluation

Predictive Modeling

Chapter 16

Predictive models

➔ Provide a way of evaluating products or designs without directly involving users, less expensive than user testing
➔ Use formulas to derive various measures of user performance
➔ Usefulness limited to systems with predictable tasks, for example, voicemail systems, smartphones, and dedicated mobile devices

Example: Fitts' Law (1954)

Fitts' Law predicts that the time to point at an object using a device is a function of the distance from the target object and the object's size.

$$T = k \log_2(\frac{D}{S} + 1.0)$$

where
T = time to move the pointer to a target
D = distance between the pointer and the target
S = size of the target
k is a constant of approximately 200 ms/bit.

Example: Fitts' Law (1954)
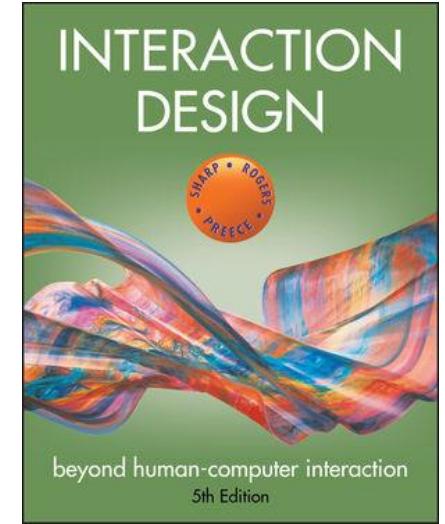
➜ **Distance:** the further away and the smaller the object, the longer the time to locate it and point to it
➜ **Size:** the bigger the target, the easier and quicker it is to reach it.
➜ It can help designers decide
  → where to locate physical or digital buttons
  → what size to make them, and
  → how close together to put them
➜ Fitts' Law is useful for evaluating systems for which the time to locate an object is important, for example, smartphones, handhelds, and mobile devices.

Summary

→ Inspections can be used to evaluate requirements, mockups, functional prototypes, or systems

→ User testing and heuristic evaluation may reveal different usability problems

→ Walkthroughs are a fine-grained focused method for evaluating small parts of a product

→ Analytics involves collecting data about users activity on a website or product to see which parts are used

→ A/B testing is a form of large-scale experiment

→ Fitts' Law can be used to predict expert, error-free performance for clearly defined tasks with limited key presses, for example, to evaluate keypress sequences for handheld devices and the position of objects on a screen

Readings

→ Chapter 15.4 Field Studies
→ Chapter 16: Evaluation: Inspections, Analytics, and Models

Any Questions?

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