STUDENT

DIT096-ABL-FOB

TENTAMEN

DIT096 VT25 LP3 Ordinarie tentamen - J

Kurskod	--
Bedömningsform	--
Starttid	18.03.2025 14:00
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Skapad av	Lisa Lindén

DAT610 / DIT096 exam intro

Welcome to the exam for Human-Computer Interaction!

Here's some basic information about the exam:

Total Points: The examination is out of a total of 100 points.
Grading Scale: The grades will be allocated as follows:

- To pass you must achieve more than 41 points.
- A grade of 3 is awarded for achieving between 41 and 60 points.
- A grade of 4 is awarded for achieving between 61 and 80 points.
- A grade of 5 is awarded for achieving between 81 and 100 points.

Examination Aids: No external aids are permitted during the examination.

Please read all instructions carefully. Some questions require you to provide the answers in a specific format or order.

We're keeping our fingers crossed for your success in the exam :)

All the best,
The HCI Teaching Team

1 UCB basics

According to ISO 9241-210, the four principles of human-centered design are

- active ✓ (no, active, passive) involvement of users
- appropriate allocation of function between users and technology ✓ (for technology over users, between users and technology, for users over technology)
- iteration ✓ (iteration, succession, implementation)of design solutions
- multi-disciplinary ✓ (multi-disciplinary, novel, creative, alternative)design

What is the initial state of the ISO 9241-210 human-centered design lifecycle?

Specify the user and organizational requirements ✗ (Specify the user and organizational requirements, Identify need for human-centered design, Evaluate designs against requirements, Produce design solutions, Understand and specify the context of use, System satisfies the specified user and organizational requirements)

Delvis rätt. 8 av 10 poäng.

2 Quantified Self

Quantified Self is commonly understood to be about measuring one's own ✓ (many users', one's own)activities in order to analyze using statistical tests ✗ (analyze using statistical tests, make interactive dashboards, aggregate, make sense)and gain personal insights ✓ (generalize, gain personal insights) about those activities.

Delvis rätt. 1.5 av 2 poäng.

3 Inclusive Design

A nice inclusive design quote is "Good design enables ✓ (enables, disables), bad design disables ✓ (enables, disables)."

Consider the following types of disabilities and situations, and chose the right one:

	Permanent	*Temporary*	*Situational*
Touch	one arm ✓ (arm injury, one arm, holding a bag)	arm injury ✓ (one arm, holding a bag, arm injury)	holding a bag ✓ (arm injury, one arm, holding a bag)
Sight	blind ✓ (blind, blinded by the sun, cataract)	blinded by the sun ✗ (blind, cataract, blinded by the sun)	cataract ✗ (blind, blinded by the sun, cataract)
Hearing	deaf ✓ (deaf, ear infection, at a music concert)	ear infection ✓ (at a music concert, ear infection, deaf)	at a music concert ✓ (deaf, at a music concert, ear infection)
Speaking	mute ✓ (mute, sore throat, heavy accent)	sore throat ✓ (mute, heavy accent, sore throat)	heavy accent ✓ (sore throat, mute, heavy accent)

Delvis rätt. 6 av 7 poäng.

4 Prototyping

A horizontal ✓ (mixed, vertical, horizontal, diagonal) prototype shows all the features, but does not implement them.

A vertical ✓ (vertical, mixed, diagonal, horizontal) prototype shows only one feature, fully implemented.

The following is a type of low fidelity prototype: paper ✓ (paper, plastic, functional, metal)

A *conceptual* prototype is more appropriate at early stages of the work ✓ (never!, at later stages of work, at any time, at early stages of the work)

A *functional* prototype is more appropriate at later stages of the work ✓ (at later stages of the work, never!, at early stages of the work, at any time)

Prototypes are useful mainly because they allow us to

do a "quick and dirty" evaluation that will inform the next iterations ✓ (determine the price of the final product, do a thorough and detailed test of the system, do a "quick and dirty" evaluation that will inform the next iterations, conduct user studies and publish academic papers)

Rätt. 6 av 6 poäng.

5 Evaluation

A *Heuristic Evaluation* is done with typically [a few] ✓ (many, a few)

[experts] ✓ (experts, representative users) and the main goal is to

[get ideas for improvement] ✗ (get ideas for improvement, identify problems) of the prototype, according to

(pick one)

- [ ] their preferences
- [x] usability principles ✓
- [ ] their performance

The *Severity Rating* of a Heuristic Evaluation is a combination of which three factors?

- [x] impact ✓
- [ ] productivity
- [x] frequency ✓
- [ ] aesthetics
- [x] persistence ✓
- [ ] cost

Usability Testing is done with typically [many] ✓ (many, a few)

[representative users] ✓ (experts, representative users) and the main goal is to

[identify problems] ✗ (get ideas for improvement, identify problems) of the prototype, according to

(pick two)

- [x] their performance ✓
- [x] usability principles ✗
- [ ] their preferences ✓

The manipulated aspects of an experiment are called [Independent] ✓ (Dependent, Independent) Variables, and are isolated through [a control condition] ✗ (a control condition, randomization).

The observed aspects of an experiment are called [Dependent] ✓ (Independent, Dependent) Variables, and are isolated through [randomization] ✗ (a control condition, randomization).

When participants are assigned to *one condition only*, this is called [between] ✓ (within, between) subjects, or [independent] ✓ (repeated, independent) measures.

When participants are assigned to *all conditions*, this is called [within] ✓ (within, between) subjects, or [repeated] ✓ (repeated, independent) measures.

Delvis rätt. 15 av 20 poäng.

6

Analysis

When considering the difference between two conditions, the *null hypothesis* would be that that

there [is no] ✓ (is no, is a) difference.

If we conduct a statistical test and the calculated *p-value* is less than our predefined *significance*

level, then we must [reject] ✓ (reject, accept, ignore) our null hypothesis.

Some typical measures of central tendency are (pick two)

- [ ] confidence interval
- [x] mean ✓
- [ ] rank
- [ ] standard deviation
- [ ] sample size
- [ ] standard error
- [ ] interquartile range
- [ ] frequency
- [x] median ✓

Some typical measures of variability are (pick three)

- [ ] sample size
- [x] interquartile range
- [x] confidence interval
- [ ] mean
- [ ] frequency
- [x] standard deviation
- [ ] standard error
- [ ] rank
- [ ] median

Rätt. 7 av 7 poäng.

7 Design a user study

A researcher named Anna wants to investigate how people use a website to find and book cinema tickets, on a computer or a mobile phone.

Help Anna to design an experiment that optimally and effectively evaluates the speed and accuracy depending on the device used.

There are 14 participants that can be recruited for the study.

She should use a within-subjects ✓ (between-subjects, within-subjects, mixed) experimental design.

Each participant should perform the task (find and book a specified cinema ticket on the website)

using the given device multiple times, for different cases ✓ (once, for a random case, once, for a specific case, multiple times, for the same case, multiple times, for different cases).

What should be the independent variable for this study?

- [ ] error rate
- [x] device used (computer, mobile) ✓
- [ ] input method
- [ ] task completion time

What should be the two dependent variables for this study?

- [ ] device used (computer, mobile)
- [ ] input method
- [x] task completion time ✓
- [x] error rate ✓

Select the statistical test which should be used to analyze the results of the study; you can consult the provided PDF diagram on the side.

- [ ] ANOVA
- [ ] Friedman
- [ ] Kruskal-Wallis
- [ ] Wilcoxon signed-rank
- [x] paired t-test
- [ ] repeated measures ANOVA
- [ ] t-test
- [ ] Mann-Whitney

Rätt. 6 av 6 poäng.

8 Essay (robot vacuum cleaners)

Plan your data gathering for the following task:

Some people have reservations about using robotic vacuums (e.g. Roomba etc) for cleaning their homes. They are either uncertain about their efficiency, or may have security / privacy concerns. You are hired as a consultant hired by Aether Corp. and your objective is to investigate how robotic cleaners are currently used to address these customer issues. Your aim is to deliver a comprehensive report outlining potential ways to enhance the company's products accordingly, to make them more acceptable to customers.

You have been allocated 10 hours for data gathering and analysis, with an additional 2 hours designated for report writing.

In your plan, you should address the following five important points:

- Research Focus
- Context of use
- Participants
- Research Questions
- Research Plan

Ensure that you complete the task thoroughly. Be concrete, provide practical answers and bear in mind how many resources you have.

Consult the rubric below to know how we will score your answer and how you can get the most points. Your text answer should be between at least 400 and up to 800 words.

Fill in your answer here

The research focus is to understand the concerns that users have towards buying and using robot vacuum cleaners. The results from this study can be used to directly adress those issues to develop a superior product. The goal is to understand how robot vacuum cleaners are currently used, if people are not convinced about the effectiveness of robot vacuum cleaners and how security and privacy concerns influence the decision of buying and using such devices.
Currently, robot vacuum cleaners are still more expensive than regular manual vacuums. The primary user group of such automated devices are young adults with an interest in tech and home automation and people who want to avoid vacuming manually. To be able to understand how robot cleaners are currently used and to identify potential concerns, the study is conducted in a controlled environment, where independent variables can be controlled best. This allows to eliminate the majority of external factors that might influence the validity of the results. A within subject design is chosen where each participant is exposed to all conditions. This avoids that results are influenced by individual opinions due to the small sample size. A mixed method design is used where quantitative questions are included to identify trends and patterns in the data and qualitative questions help to gain a better understanding about the reasoning behind the answers. In a semi structured interview, predefined questions are used together with more open ended questions. This allows to compare the answers between participants while maintaining the ability to engage in follow up questions depending on each interview.
As analysed by Kelly Caine in 2016, the "local standart" and a good rule of thumb for the number of participants for a user study is 12. Due to the limited ressources available, six to eight participants are recruited. Those individuals need to be choosen carefully to later obtain representative results. They should represent the companys current users as well as potential future customers that currently still have concerns about the products. Preceeding the interviews, those individuals fill out a short survey that includes basic information about their previous experience with robot vacuum cleaners and potential concerns. In addition to the group of individuals, one or two experts are recruited who can give reasoning and deeper insights into the topics covered. Furhter, one to two IT specialists are recruited who can assist

with technical questions and who can discuss the feasability of certain proposals.
The research questions for the study include questions about the concerns people have regarding the security and privacy of the devices. In what way does the internet influence their opinion in this regard and would devices that are not connected to the internet resolve some of those concerns? Further we want to investigate how robotic vacuum cleaners are currently used in the participants homes. In what setting and how often are they currently used? If the use of the robotic vacuum cleaners has declined after the initial purpose, the goal is to understand what the reasons where for this. Regarding the satisfaction with the current system, the goal is to understand if the user experience is intuitive and what aspects the user expects differently. This relates to the gulf of execution and the gulf of evaluation to determine if the user receives the feedback he/she expected from the system.
The research is divided into sections to not exeed the time available. The first 15 minutes is allocated to welcome to participants and to answer initial questions about the study. In the following 45 minutes, the users fill out the initial survey. This initial setup is followed by 3 hours of interviews and tests where each participant is interviewed individually. One additional hour is spend to discuss more suffisciated question with the experts and in the final 3 hours of the study, a discussion with a focus group of all participants is held to engange in a conversation and gain insights on different opinions as well as potential ideas and solutions.
The final two hours are used for data analysis where tools like Matlab and Excel are used to process and analyse the data and tools like PowerBI to showcase the data that is later used in the report. The report is then written with a focus on clarity and understandability to most accurately present the results of the study to the company.

Ord: 728

Choice of research focus

4pt - clear focus with logical motivation

2pt - clear focus

0pt - no focus or vague

Choice of context of use

4pt - defined with clear motivation

2pt - defined but lacks motivation

0pt - not defined or generic

Participant group

6pt - clearly identified and explained

3pt - identified but without a logical explanation

0pt - too broad or no indication

Choice of RQs

6pt - explicitly stated, contributing to the design process

3pt - stated but with limited impact on the design process

0pt - vague or generic, not actionable

Research plan

10pt - clear plan, motivated choice of methods, feasible using the available resources

5pt - lacks detailed description, vague motivation of methods, requires additional or not using available resources

0pt - multiple flaws, or hard to understand

Total points: 30

Besvarad.

9 Essay (project work reflection)

You have probably (and hopefully!) spent a significant amount of time in this course working on your group project.

We would like you now to *reflect* (as an individual member of the group) on the overall experience from this activity, and write a few sentences below on:

- the **user-centered design** approach (maybe contrast it any of your previous project or work experiences)
- something that you **did not expect** at all when you started working on the project, or something that **turned out differently** to what you hoped
- what you would **do differently** if you were to do it again (either a different direction, approach, or something that might have improved your results)
- what do you think you could **bring forth and apply to your future projects or work**

Each of the above will be scored up to 3 points giving overall 4x3=12 points (less points for not discussing something, more points for fully elaborating; some parts might be overlapping but try to be clear, formal, and precise)

No need to describe or present the actual project in detail, focus on the **lessons learned**.

(Suggested text length around 400 to 500 words or so)

Fill in your answer here

The user-centered design approach applied to our prototype for an ice bathing app contrasts vastly to my previous work, as the intended user group differs substantially. A lot of my previous work at university relate to concepts from theoretical computer science and numerical mathematics that are targeted towards highly specialized professionals where the focus lies on the functionality rather than the user experience. In later stages of the degree however, it has become more and more important to make those abstract concepts accessible for a broader range of users which is why user centered design has become more and more important as well.

The project helped in this context to test out and understand different methods learned in the lecture on a real world example. This includes the importance of UCD and how the design process can - even without intention - disadvantage people when using the product. It also includes aspects of user-centered design that help users interact with the system, such as Normans Design Principles and concepts like the gulf of evaluation and gulf of execution.

The main aspect that turned out different to what I expected is how much the design was able to change and adapt to the users needs in such a short period of time. The iterative approach improved the design every week with the new methods that were introduced along side it in the lecture. I also did not expect to be able to collect as much data in the surveys and how much that data, even with a relatively small sample size of 25 participants was able to improve the design.

With the experience gained from the project, there are certain aspects that can be improved in future work. The set up of the questions in surveys has an immediate impact on the quality of the analysis that can be performed afterwards. The type of questions are significant to the overall validity of the analysis. It is also significant to recruit a broader range of participants in the survey. Our questions have only been answered by people withing a ice bathing community. This affects the external validity and most likely does not generalize well to a broader user group.

Some of the learnings can immediately be applied to future projects. As initially discussed, the user group of some of my projects has recently broadened and now includes people with less domain knowledge. The concept of think out loud experiments can immediately be applied to an interface that i am currently building. The general idea of an iterative design process with

low fidelity prototypes in the early stages of the development and a summative analysis at the end of the development can also directly be applied to my current work and will most likely improve the design of the product significantly. The awareness about the influence of certain design decisions and knowledge about different evaluation methods will benefit many of my future work projects.

Ord: 491

Besvarad.