Human Computer Interaction

From principles to practice

Hisham Ihshaish | Birzeit University

COMP322 | Based on: Interaction Design, 6th Ed. (Rogers, Sharp, Preece)

Today's agenda

01 **Quick recap**

Connecting Lectures 1 and 2 into a coherent toolkit

02 **Heuristic evaluation in practice**

How to actually run one, with a worked example

03 **Understanding your users**

Personas, scenarios, and user stories

04 **Accessibility and inclusive design**

WCAG, universal design, and why it matters

05 **Activity: spot the violations**

Applying what we have learned to real interfaces

Where we are so far

Three lectures, one connected toolkit

Today we move from knowing about HCI to doing HCI.

You will learn methods you can apply to your course project and in professional practice.

Heuristic evaluation in practice

From theory to method

How to conduct a heuristic evaluation

1

Select evaluators

3 to 5 evaluators is the sweet spot. Nielsen's research shows that 5 evaluators find roughly 75% of usability problems. They should have some HCI knowledge but need not be expert users of the system.

2

Brief the evaluators

Give them the system, a set of representative tasks, and the list of 10 heuristics. Each evaluator works independently to avoid groupthink.

3

Evaluate independently

Each evaluator goes through the interface **at least twice**: once for flow, once for detail. They note every violation, linking it to a specific heuristic.

4

Consolidate and rate severity

After all evaluations are done, compile a master list of unique problems. Then have evaluators rate severity independently using Nielsen's 0 to 4 scale.

Nielsen's severity rating scale

Three factors determine severity: frequency, impact, and persistence

0	**Not a problem**	Evaluator does not agree this is a usability issue
1	**Cosmetic**	Fix only if extra time is available. Does not affect task completion.
2	**Minor**	Low priority. Users can work around it with minor effort.
3	**Major**	High priority. Causes significant difficulty or confusion.
4	**Catastrophe**	Must be fixed before release. Users cannot complete their task.

Final severity = mean of all evaluators' independent ratings

Worked example: university registration

Imagine evaluating a system where students register for courses online.

F1 System shows 'Error: invalid input' when a student enters a course code in lowercase. No guidance on expected format.

Severity: 3

H5: Error prevention

F2 After successfully registering, the system shows no confirmation message. Students are unsure if registration went through.

Severity: 4

H1: Visibility of system status

F3 The 'Drop course' and 'Add course' buttons are identical in size, colour, and placement. Easy to click the wrong one.

Severity: 3

H5: Error prevention
H4: Consistency

Understanding your users

Personas, scenarios, and user stories

What are personas?

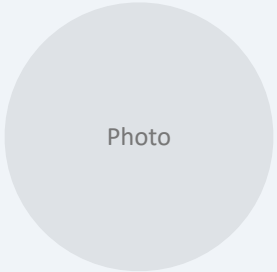
A persona is a fictional but realistic description of a typical user of the system being designed. It is not a real person, but it is based on real data from user research.

Why use personas?

- They replace vague "the user" with a specific, named person with concrete goals
- They help the team make design decisions: "Would Layla find this confusing?"
- They prevent designing for yourself instead of your actual users
- They are grounded in research (interviews, surveys, observation), not assumptions

A typical persona includes: name, photo, demographics, goals, frustrations, tech literacy, and a quote that captures their attitude.

Example persona



Layla Mansour, 21

3rd-year Computer Science student

Birzeit University, Ramallah

"I just want to register for my courses without it feeling like a puzzle."

Tech: iPhone 14, uses WhatsApp, Instagram, GitHub. Comfortable with tech but impatient with bad design.

Goals

- Register for courses quickly between classes
- Avoid schedule conflicts without manual checking
- Access her transcript on her phone

Frustrations

- Registration system crashes during peak hours
- Cannot tell if a section is full until she tries to add it
- Course prerequisites are buried in a PDF, not shown in the system

Context

Often registers while commuting to university on unreliable mobile data. Switches between Arabic and English interfaces depending on the app.

Scenarios and user stories

Scenario (narrative form)

Layla is on the bus to campus. She opens the registration app on her phone. She searches for COMP322 and sees that Section 1 is full but Section 2 has 3 seats left. She taps 'Add' and receives a confirmation with the updated schedule. The whole process takes under 30 seconds.

User story (agile format)

As a **student**, I want to **see real-time seat availability** so that **I do not waste time trying to register for full sections.**

Scenarios describe what happens. User stories describe what the user needs and why.

Accessibility and inclusive design

Designing for everyone, not just most people

Universal design and accessibility

Universal design

Coined by architect Ron Mace (1997) at NC State University. The idea: design products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design.

Example: Curb cuts in pavements were designed for wheelchair users but benefit everyone: parents with pushchairs, travellers with suitcases, cyclists.

Accessibility in HCI

Accessibility means ensuring that people with disabilities can perceive, understand, navigate, and interact with digital products. This includes visual, auditory, motor, and cognitive disabilities.

Common barriers: missing alt text on images, low colour contrast, no keyboard navigation, auto-playing video without captions, tiny touch targets on mobile.

The curb-cut effect: features designed for accessibility often benefit all users.

Feature	Designed for	Benefits everyone
Captions on videos	Deaf/hard of hearing users	People in noisy environments, non-native speakers
Voice assistants	Motor-impaired users	Drivers, cooks with messy hands
High-contrast mode	Low-vision users	Anyone using a phone in bright sunlight

WCAG 2.2 at a glance

Web Content Accessibility Guidelines, W3C Recommendation (October 2023)

P — **Perceivable**
قابل للإدراك

Users must be able to perceive the information. Provide text alternatives for images, captions for video, sufficient colour contrast.

O — **Operable**
قابل للتشغيل

Users must be able to operate the interface. Support keyboard navigation, provide enough time, avoid seizure-inducing content.

U — **Understandable**
قابل للفهم

Content and operation must be understandable. Use clear language, predictable navigation, and helpful error messages.

R — **Robust**
متين

Content must work across different technologies: browsers, assistive tools, devices. Use valid, semantic HTML.

Three conformance levels: A (minimum), AA (target for most laws), AAA (highest)

Accessibility in your context

Real-world examples and regional considerations

RTL layout challenges

Arabic is a right-to-left (RTL) language. Many frameworks and design systems are built for LTR by default. Proper RTL support means mirroring layouts, navigation, icons with direction (e.g., back arrows), and ensuring text alignment is correct. Incomplete RTL support is a significant accessibility barrier for Arabic-speaking users.

Screen reader support for Arabic

Arabic screen reader support has improved significantly. Apple's VoiceOver supports Arabic well. NVDA (free, open source) has good Arabic support on Windows. JAWS also supports Arabic. However, many websites still do not set the lang attribute to 'ar', causing screen readers to mispronounce Arabic text using English phonetics.

Everyday accessibility wins you already use

WhatsApp voice messages	Originally an accessibility feature, now the dominant way many people communicate in the Arab world
Dark mode on iOS/Android	Reduces eye strain for low-vision users but is now a mainstream preference for everyone
Autocomplete in search bars	Reduces cognitive load and typing effort, helping users with motor or cognitive disabilities
YouTube auto-captions	Essential for deaf users, widely used by language learners and people in quiet environments

Putting it all together

Apply what you have learned

Activity: spot the violations

Compare these two login screen descriptions and identify heuristic violations.

Design A: problematic login

- No label on the username field, just a blank box
- Password field shows characters in plain text
- Submit button says 'Go' with no visual emphasis
- On error, the entire form clears and shows 'Error' in red with no further explanation
- No 'Forgot password' link anywhere
- Tab key does not move between fields

Design B: well-designed login

- Clear labels: 'Email address' and 'Password'
- Password masked by default with a 'show/hide' toggle
- Primary button says 'Log in' with high contrast
- On error: 'Incorrect email or password. Please try again.' Fields retain entered email.
- 'Forgot password?' link below the form
- Full keyboard navigation; focus indicator visible

In pairs (3 min): list the heuristics Design A violates and assign a severity rating to each.

Your HCI toolkit so far

Understand	HCI definition, UCD process (ISO 9241-210), usability goals (ISO 9241-11)
Design	Norman's 6 principles (affordances, signifiers, mapping, feedback, constraints, conceptual models)
Model users	Personas, scenarios, user stories
Evaluate	Nielsen's 10 heuristics, severity rating scale (0-4), heuristic evaluation method
Include	Universal design, WCAG 2.2 (POUR), curb-cut effect, RTL and Arabic considerations

From Lecture 4 onwards, we go deeper into the textbook chapters.

Next session

What is interaction design?

We begin working through the textbook (Chapters 1-2).

Topics include:

- The design process in detail: the double diamond model
- Design thinking and ideation techniques
- Understanding and conceptualising interaction
- Interaction types: instructing, conversing, manipulating, exploring

Suggested reading:

Rogers, Sharp, Preece. Interaction Design, Chapters 1 and 2.

Norman, D. The Design of Everyday Things, Chapter 6 (Design Thinking).

References

Rogers, Y., Sharp, H., & Preece, J. (2024). Interaction Design: Beyond Human-Computer Interaction. 6th Ed. Wiley.

Norman, D. (2013). The Design of Everyday Things: Revised and Expanded Edition. Basic Books.

Nielsen, J. (1994). Usability Inspection Methods. John Wiley & Sons.

Nielsen, J. (1995). Severity Ratings for Usability Problems. nngroup.com.

Nielsen, J. & Molich, R. (1990). Heuristic evaluation of user interfaces. Proc. CHI '90, ACM, 249-256.

Cooper, A., Reimann, R., Cronin, D., & Noessel, C. (2014). About Face: The Essentials of Interaction Design. 4th Ed. Wiley.

Carroll, J.M. (2000). Making Use: Scenario-Based Design of Human-Computer Interactions. MIT Press.

W3C (2023). Web Content Accessibility Guidelines (WCAG) 2.2. w3.org/TR/WCAG22/.

Mace, R. (1997). The Principles of Universal Design. NC State University.

Lazar, J., Feng, J.H., & Hochheiser, H. (2017). Research Methods in HCI. 2nd Ed. Morgan Kaufmann.