Digital Technologies | Hangarau Matihiko
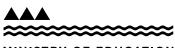
Level 6 – New Zealand Curriculum

Teaching and learning programme

An interactive online learning module: Human–computer interface

MINISTRY OF EDUCATION
TE TĀHUHU O TE MĀTAURANGA

External links to websites
The Ministry of Education does not accept any liability for the accuracy of information on external websites, nor for the accuracy or content of any third-party website accessed via a hyperlink from this resource. Links to other websites should not be taken as endorsement of those sites or of products offered on those sites. Some websites have dynamic content, and we cannot accept liability for the content that is displayed.

Summary

This teaching and learning programme provides interactive online learning modules that support students to be able to complete a report evaluating a human–computer interface in terms of usability heuristics. Teachers are able to easily add to or amend the modules with their own activities or examples to make the programme their own. Classroom activities that could be used to supplement the modules are described in the outline below.

By the end of this teaching and learning programme, students will be able to:

- describe the role of a chosen user interface
- identify examples from a given user interface that illustrates usability heuristics
- evaluate a given human–computer interface in terms of usability heuristics
- suggest improvements to a given human–computer interface by comparing and contrasting related interfaces.

Duration (terms, weeks, teaching periods)

6–8 weeks

Key teaching and learning concepts – the big ideas

There are many ways in which humans and computers can interact. The nature and success of these interactions depends on both the needs and expectations of the human and the usability and features of the computer. We can use the usability heuristics to design and evaluate human–computer interactions.

Alignment to NZC and/or Te Marautanga

DTHM – Designing and Developing Digital Outcomes (DDDO)

- Students understand that digital applications and systems are created for humans by humans. They develop increasingly sophisticated understandings and skills related to designing and producing quality, fit-for-purpose, digital outcomes.

Links to other learning areas

- Design – in terms of considering their audience
- English and/or literacy – in terms of completing a report.

Teaching and learning pedagogy

This programme can be used as either a blended or flipped model, with students completing activities and watching videos in the online modules in class or at home. Teachers can also use forums, polls, peer and teacher evaluation to engage with learners in the system.

Prior knowledge/place in learning journey

This programme supports learners to evaluate the usability of their own designs, so makes a great prerequisite for any tasks that require students to design interfaces.

Resources required

Internet access and online resource.

How you might adapt this in your classroom

Suggested activities to extend learners are described in the outline below. Teachers can also adapt the programme by adding contexts relevant to their particular learners or LTI to link in with existing applications.

Assessment

Students create a report that evaluates a human computer interface in terms of usability heuristics.

Term outline

The Learning context:

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources

Introduction	½ lesson	• Identify examples of user interfaces
		
		• Define HCI
		
		• Describe the purpose of a simple interaction.
			• Students :
			  – identify examples of the user interface on their computer: mouse, keyboard, screen
			  – describe the purpose/role of that interface.
			
			• Optional extra: show students what was used before interfaces, using this timeline of computer history.	

The human element of HCI	½ lesson	• Identify which senses are used in a given HCI.	• Based on the examples of user interfaces provided, students match the sense with an interface (keyboard, mouse, monitor, printer, microphone, VR headset. (Feedback needs to explain that these are examples of HCI)
			
			• Students describe an example of one or two applications they use that focus on a chosen sense.
			
			Class discussion or forum
			
			• Watch TRANSFORM – Amazing Technology Invented by MIT. After watching, allow for natural discussion:
			  – Which did students think was the coolest example?
			  – What senses are we using?
			  – Potential applications?	

The Learning context *(continued)*:

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources
			• Follow up with <u>Shape-shifting tech will change work as we know it | Sean Follmer</u>. Potential discussion prompts depending on the interests and levels of your students: – Sean describes interacting with our forms as a "richer" way of interacting. What do you think? – At the end we saw a game played on a mobile using physical buttons. We had devices like this many years ago. Is this nostalgia? Progress? Regression? Why do you think designers would want to incorporate physical buttons again? – At what point do computer interactions limit our non-computer interactions? – Is this making a table more useful or unnecessarily complex?	
Different users have different needs	1 lesson	• Describe an example where different users would have different needs.	• Students match a special need with a user interface (Zimmer frame, hearing aide, braille book). • They describe a time when they (or someone they've known) has had to use a tool for a disability. They then explain the purpose of that tool and describe the features that enable this purpose. **Optional extra** • Have students create user personas, one for themselves and one for another user type, eg, their sibling, parent, teacher.	• Xtensio takes students through <u>How to create a persona</u> and has a tool they can use. • <u>Example student personas</u> from the Open Polytechnic.

The Learning context *(continued)*:

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources
Understanding the computer element	½ lesson	• Describe the input, output, and processors for a chosen device.	**Class discussion or forum** • In what ways are humans different from computers? • In what ways are they the same? • Students match the tool/device with its intended use/purpose (MS Word, iWatch, iPhone, digital scales, Facebook) • Students identify and match the component as an input, output, or process (mouse, screen, RAM). **Optional extra:The difference between humans and machines.** • This idea has been prevalent in popular culture, so you could talk to students about humans, Ex machina or I,Robot, then segue into the Turing test. Ask students: Have they used chatbots before? This could lead into a discussion about how interaction design could simulate human conversation or … if it should?	• <u>The Turing test: Can a computer pass for a human?</u> explains the Turing test and describes a few of the chatbots that have passed this test. • Woebot is an example of a chatbot that students can sign up to chat with through Messenger to explore the nature of the interactions. *Note: Woebot is a chatbot designed by Stanford University to help people monitor moods and learn about themselves. The content learners will see in Woebot is largely around emotional intelligence and resilience. However, if you have concerns about using Woebot with your class you could try "https://poncho.is/" Poncho the weather cat or "http://santa.botlibre. com/" Santa bot."*

The Learning context *(continued)*:

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources
Understanding interactions	1 lesson	• Use the process of a cognitive walkthrough to record interactions with a device.	**Class activity** • Ask a volunteer to do a "think-aloud walkthrough" of performing a simple task, such as eating an orange, making a paper plane, tying a shoelace, or setting an alarm on their phone. (This would be best if you can show their display on the projector.) • Students describe or draw the steps they (as a user) go through to perform a simple task, for instance, pair with a new bluetooth device, transfer money to someone, purchase something from an online store. • They should record each step and describe the role it played in the process to complete the task.	• How to do a cognitive walkthrough

What is usability?	½ lesson	• Align features of a tool with its intended use.	• Students describe an instance where they've found something hard to interact with for some reason.
			• Students find five examples of poor user design examples. They then explain why they are bad examples.
			• Students describe an application/ site they use that they find easy and enjoyable to use.
			  – What is it about this application/site that makes it so great to use?
			  – Then they should describe the role of this application, what is its purpose?	

The Learning context *(continued)***:**

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources
Trade-offs	½ lesson	• Identify instances where designers sacrificed in one area to gain in another.	• Discuss with students how a HCI may be good in one way but not others – trade-offs, for instance, put all buttons on the screen but then lose screen real estate. **Class discussion or forum** • Many of us have different devices these days – possibly a phone, tablet or laptop. • Which activities do you use for which? • At what point would you switch from using one to the other? For example, writing an essay, gaming or shopping online? • What is it about the design or nature of interactions that makes you switch?	
Module two: Usability				
Introduction to usability and heuristics	½ lesson	• Identify instances where designers sacrificed in one area to gain in another.	• Think back to comments about an application/site you love using. Write down (on small slips of paper) five aspects that make this great to use. **Class activity** • In groups or as a class, get students to see if there are similarities in what they've written. Can they categorise/group the reasons?	

The Learning context *(continued)*:

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources
Visibility	½ lesson	• Give an example of the visibility heuristic • Explain how a given interface performs in relation to visibility.	• Explore examples of the heuristic: time till arrival on Google Maps, fuel gauge, progress bar. • Rank these progress visuals in order of effectiveness: spinning wheels, endless clock, or progress bar or progress bar with % symbol.	
Difference between system and real world	½ lesson	• Give an example of the difference between a system and a real world heuristic • Explain how a given interface performs in relation to the difference between system and real world.	• Explore examples of the heuristic: US calendar entries, floppy disk for saving, and inverted traffic. • Identify the most obvious colour for these signs: hot/cold, stop/go, warning, exit.	
Consistency in standards	½ lesson	• Give an example of the consistency in standards heuristic • Explain how a given interface performs in relation to consistency in standards.	• Explore examples of the heuristic: play, stop, pause button, back, hyperlinks change colour. • Match the keystrokes to the emoji.	
Recognition	½ lesson	• Give an example of the recognition heuristic • Explain how a given interface performs in relation to recognition.	• Explore examples of the heuristic: Word icons, predictive text • Suggest some improved alternatives to historic icons: Save, paper shredder instead of rubbish bin, etc.	

The Learning context *(continued)***:**

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources
Error prevention	½ lesson	• Give an example of the error prevention heuristic • Explain how a given interface performs in relation to error prevention.	• Explore examples of the heuristic: account remains active for X days, "Are you sure?" • Three "close" exercises to make a meaningful error message.	
Error recovery	½ lesson	• Give an example of the error recovery heuristic • Explain how a given interface performs in relation to error recovery.	• Explore examples of the heuristic – "Did you mean:", recycle bin. • Based on five examples of good and bad error messages, students rank them in order. • Suggest an even better error message for a given example.	
User control and freedom	½ lesson	• Give an example of the user control and freedom heuristic • Explain how a given interface performs in relation to user control and freedom.	• Explore examples of the heuristic – undo/redo and the AdBlocker ability to block on certain pages or certain ads. • Identify examples of interactions with a computer that may require confirmation: exit without saving, restart, bank transfer, etc; copy a file vs. delete a file.	
Flexibility	½ lesson	• Give an example of the flexibility heuristic • Explain how a given interface performs in relation to flexibility.	• Explore examples of the heuristic – quick keys, font sizing, zooming on phone, gesture typing, fingerprint swipe • Identify these for common shortcut keys: CtrL+C, etc, and describe the role they perform.	

The Learning context *(continued)*:

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources
Aesthetics	½ lesson	• Give an example of the aesthetics heuristic • Explain how a given interface performs in relation to aesthetics.	• Explore examples of the heuristic – Web page, white space, font size, colours. Giving users the opportunity to customise their page. • On a website builder, move buttons, change background colours, text colours, etc with the goal of making either the most useless or the best interface. • Suggest some alternative colour schemes for simple layouts and justify your decisions.	
Help	½ lesson	• Give an example of the help heuristic • Explain how a given interface performs in relation to help.	• Explore examples of the heuristic – Age of Empires, kids' games indicate which button to press. • Find two example sites/applications that provide help within the site. Which is better? Why? How could the poorer example be improved?	

The Learning context *(continued)*:

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources
Module three: Reporting				

Beginning writing	1 lesson	• State the purpose of an interface
		• Write an evaluative sentence about an interface based on the usability heuristics
		• Suggest an improvement to an interface based on the usability heuristics.
			Class activity
			• In pairs or groups, students can use the evaluation sentence starters to interview one another on their opinion of an interface.
			• With an example interface (older interfaces are used as examples so that students can more easily think of improvements):
			  – state the purpose of the interface
			  – write an evaluative sentence about the interface based on the usability heuristics
			  – use one of the sentence starters to suggest an improvement based on the usability heuristics.
				• <u>Evaluation sentence starters</u>

Evaluation and critique	1 lesson	• Critique an interface with reference to the relevant heuristics.	• Students are scaffolded through a critique of an interface with reference to the relevant heuristics.	
Choosing a device or GUI	½ lesson	• Identify a suitable interface to evaluate.	• Students choose a suitable device for the report. • Identify which devices are suitable (or not).	

The Learning context *(continued)***:**

What is being covered	Approximate duration	Specific Learning Outcomes Students will be able to:	Learning Activities	Resources
Gathering evidence	⅓ lesson	• Undertake a survey of users to support an evaluation of a human–computer interface.	• Remind students of the cognitive walkthrough. • Students give peer review and opinions. • For a chosen user interface, students ask peers what their opinion is, based on the usability heuristics. You may prompt them with some sentences. • Students can use this feedback in their report if they use the device they are reporting on.	
Images	⅓ lesson	• Select images to support an evaluation of a human–computer interface.	• Given a few typical evaluation statements and images, select the images that best support the evaluation statements.	
Referencing	⅓ lesson	• Provide references to support an evaluation of a human–computer interface.	• Find links to websites that provide additional information that reinforces what has been learnt so far.	
Exemplary work	½ lesson	• Analyse reports to identify if they have met the standard.	• Given a list of exemplar sentences and paragraphs, students rank them as NA, A , M and E.	
Writing your report	3 lessons	• Create a report that evaluates a human–computer interface in terms of usability heuristics.	• Write a report from supplied template and guidelines.	