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Designing for navigation and wayfinding in 3D virtual learning spaces

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What are the usability problems with 3D virtual learning spaces?

The research was not concerned with the design of the Second Life user interface

• Two related problems were identified: difficulties in navigation and wayfinding
• Why do these problems exist?
• How do these problems impact on educators and students?
Why are navigational aids important?

- Imagine visiting a city in a foreign country or an island in Second Life for the first time. How would you find your way around?
- Signage is one form of navigational aid, but it is not necessarily the solution.
- Signs might be too small, people might not understand them, or they may be poorly located.
- Even without these problems, signs aren’t the solution to wayfinding.
- Wayfinding is about using other visual clues such as colour coding and feedback.

How did we address the usability problems?

By identifying and integrating navigation mechanisms from different environments:

- Mechanisms for real-world navigation
- Mechanisms for navigation in virtual environments
  - 2D virtual environments (the Web)
  - 3D virtual environments (computer games and Second Life)

**Research question:** In the design of 3D learning spaces to facilitate navigation and wayfinding, can the principles of game usability and Web usability complement the mechanisms of real-world navigation?
Which navigational aids are applicable to Second Life?

• Real-world navigation aids such as architectural landmarks, maps, paths and signs
• Navigational aids from 2D virtual environments such as the home page of a web site and hyperlinks
• Navigational aids from 3D virtual environments
  – audio/video tutorials, HUDs and camera controls from computer gaming
  – notecards, teleportation and an avatar’s capability to fly in Second Life

Evaluating the effectiveness of navigational aids and peoples’ wayfinding strategies

• Evaluate the usability of 3D learning spaces with the stakeholders (designers, educators and students)
• A combination of research techniques was used: expert evaluations and studies involving human participants
  – Heuristic evaluations
  – User observations with think-aloud protocols and post-activity discussions
  – Interviews with designers of 3D learning spaces, educators and an ISTE group tour guide
Ethical considerations

- Recruiting participants
- The consent process
  - project summary sheet
  - consent form
  - include contact details of supervisor, project leader (including real-world information)
- Data collection and storage
- Retaining anonymity
- Approval of the research by the University’s ethics committee
- Second Life snapshots

Data analysis

Thematic analysis was conducted on the:

- Transcriptions of
  - The user observations and post-activity discussions
  - The designer interviews
  - The educator interviews
  - The ISTE tour guide interview
- Heuristic evaluation data
Research findings: Effect on student’s ability to perform learning activities

- Students may become frustrated or confused
- Students may make incorrect assumptions or may guess
- Students may aimlessly wander looking for their destination
- Learning activities will take longer than necessary
- Students may abandon learning activities
- Students may return to the entry point to find help

Research findings: The user experience is affected by the lack of navigational aids

Participant quotes:

“We have a library here on campus here at Walton Hall so I was looking for something that looked like that”

“It looks nothing like a library. I would have never had guessed”
Research findings: Entry point design

• The design of the entry point is a crucial aspect of 3D learning space design
• It is important to make a good first impression on the user
• Design to orientate the user at the entry point e.g. Consider
  – having a 3D interactive model of the island
  – having an introductory tour
  – having an introductory video about the island
• The entry point serves as a place where users can return to for help
• The principles for the design of entry points for the Web can be applied to the entry points of 3D spaces

The re-designed entry point of The Abyss Observatory
Consistency and grouping

- Inconsistent design of the teleporters
- Inconsistency in the colours of teleporters and directional signs
- Items are not grouped in categories
- A good practice example of grouping by colour

Research findings: Design aspects that aid navigation and wayfinding

- Audio or visual feedback to user’s actions should be easy to notice and appropriate to match with the context
- Colour and formatting is important in the design of objects
- Objects that are similar to real-world objects are easy to recognise
- Key locations should be easy to find or access
- Pathways and entrances should be easy to understand
- Signs and symbols to aid navigation should be easy to understand
- Well-structured islands make it easier to find one’s way around
Identification signs and directional signs

- The entrance to the deep|think library
- Identification sign for the student room
- Lack of directional signs at an intersection
- Directional signs at an intersection

Research findings: Wayfinding strategies

- The most popular method of moving around in Second Life is teleportation
- The level of Second Life experience can influence a user’s wayfinding strategy
- If users cannot easily find their way around, they resort to the use of camera controls, flying or walking
- Therefore, provide a range of mechanisms to support navigation
- Design 3D learning spaces in an iterative process involving evaluations with users and re-design
Orienting the user, path design

- Tour for orientation
- Notecard with descriptions of the functional areas
- A teleport board
- Transition points in the paths

Positioning of the maps

- The teleport map is positioned close to the entry point and is easy to notice
- The map is obscured by the plant
Visual prominence of objects

- Current position and possible locations are obvious and clear.
- The button to call the elevator blends in the background.

Easy to follow paths

- Easy to follow paths to key locations in the island.
- The path ends abruptly before the final destination in one of the sub-tours of the Marine Science museum.
Can the user identify their destination?

- Location is clearly identified by signage.
- There is no sign that this is the Abbey; further, the design does not look like a real-world Abbey.

Can the user return to pre-set locations?

- Teleport maps indicating the entry point or landing areas in key locations.
- There is no easy way to return to the entry point other than by walking or by flying to look for it.
Examples of good practice

- Directional signs at intersections
- Clear teleport instructions
- Labels embedded within maps and a "You are here" to help orient the user
- Path legibility

Outcomes of the research: Enhancing the designer’s toolbox

- A set of heuristics for the design of 3D learning spaces or other islands in Second Life
- Many of the heuristics are specific to navigation and wayfinding
- Many of the heuristics are applicable to any island in Second Life
- Design guidelines for 3D learning spaces
- Exemplars for best practice guidelines for navigational aids
Future research

• Quantitative data analysis e.g. studying how task performance is affected by implementing design changes
• Developing usability metrics to studying wayfinding performance
• Evaluating wayfinding strategies in real-world simulations of architectural structures