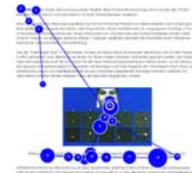


Eye Tracking and e-Learning:

22 Useful hints

1. Eye movements' statistics show that **headlines and high detail graphics influence students' initial visual behaviour** at attending of first pages of an e-learning environment. Only after these elements is text (or content in general) processed!



2. Note that in general **pictures of (obviously) low-information level** are visually ignored.



3. Within e-learning environments **text blocks are seen as 'bearer of knowledge'**, so they are processed (at least) by twice higher fixation intensities than other elements.

4. **Complex, text-based learning materials** should be broke apart into 'digestible portions', as within e-learning reading of long difficult text turns relatively fast into monotonous, imprecise processing of text.

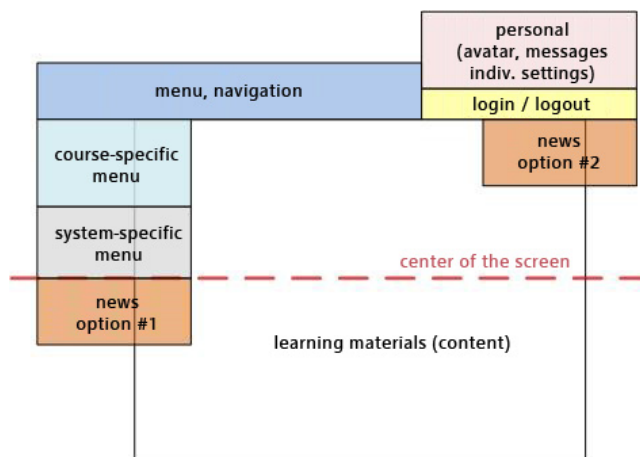
5. *Little additional work with great effect!* Consider **design aspects to guide your students' eyes**: e.g. with borders, enumerations, numberings, indentations, change of colour contrast, outstanding positioning as well as clever usage of empty space (!)



6. Please **do not use small text size** ... spectacle wearers will thank you for doing so! Eye tracking clearly shows that optimal text sizes imply fewer amounts of fixations that occur before clicking.



7. Where do students look for certain elements? Empiric eye tracking studies of e-learning environments imply the following contextual **expectations for specific areas for the screen**:



8. Try to **avoid (competing) buttons with strongly similar functions** on one page. A clear differentiation of buttons' functionalities saves lots of fixations that would be needed for comparison.

9. Remember one crucial rule of thumb: Within e-learning the **dominance of the central area** is omnipresent! Students start their exploration predominantly in the centre of the course page. So, if you want to teach in eye-catching manner, place the most important elements in the (central) content area.

10. E-Learning environments should have a **'help' item**, as it reduces support requests as well as enables self-driven problem solving. Eye tracking shows that labelling – such as 'faq' or 'tutorials' – are fixated less. So, using a simple 'Help' button is the most efficient way for labelling support.

11. **Avoid using heavily text-oriented pages or blocks.** Your students would not read them ...

12. Note that **left hand oriented** reading is also valid for **course navigation**. Eye tracking studies yield that the relation of overall fixation intensities between the left and the right columns are 80 to 20 percent.



13. The **lower half of the display** screen is processed by fewer fixations, so education content that appears there is **visually disadvantaged**. (In particular teachers are advised against placing content in the lower right area of the screen.)

14. Try to **separate course-specific menu items from system-specific functions**. Mixing them up generate longer gaze paths, unnecessary fixations or in worst case stopping of exploration (or maybe ending of conscious learning).

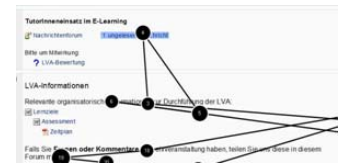
15. The efficiency of visual search increases if the **semantic coherence of e-learning areas** is given. A code-based functional differentiation within the learning environment (e.g. separation of internal developments and software core code) is irrelevant for students. It is just causing confusion.

16. Mostly, e-learning failities try to provide as many software features for learning as possible, causing hereby **overloaded user interfaces** that are **difficult to memorise** by students. As a consequence students have to **sequentially 'comb through'** menu items each time they login. So, it is recommended to structure or reduce the visible elements.



17. Try to **concentrate on the learning materials** and (if possible) **eliminate distracting elements**, such as irrelevant blocks, features or navigation options. For example, in Moodle changing from a 3- to a 2-column layout enables focusing on the content.

18. **Avoid using low colour contrast for fonts**, as they reduce students' willingness for reading within an e-learning environment. Even 'pop out' effects are dealt superficially, without extracting its content.

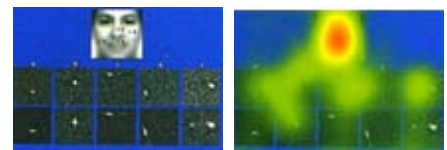


19. Note that **multiline buttons repress visual exploration**, as they are difficult to interpret. Furthermore they provoke lots of unnecessary fixations.

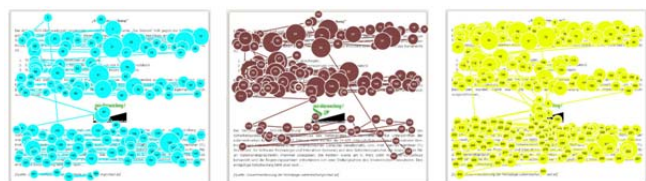


20. Redundancy in case of availability might be useful, but if there are too many (competing) paths towards the same goal, memorability may suffer. Try to **define unique paths for each task**.

21. **Students' visual attention is magically drawn to human faces**. Use this phenomenon cleverly to guide your students' eyes to important aspects of your topic.



22. **Motivation of students pays off!** Visual attention in context of e-learning increases if students' involvement is higher. The graphic on the left demonstrates a motivated student's gaze path, whereas the central figure displays eye movements of a disinterested student. On the right picture the gaze plot of a moderately-motivated student is shown, who's reading drifts fairly soon to 'monotonous processing of words'.



Contact:  *DI Mag Gergely RAKOCZI*
Vienna University of Technology
rakoczi@tuwien.ac.at