

Guidelines for developing E-learning medical applications

By Jo Cranwell, Azia Mughal & Lucy Gill, February 2011

Summary

ExperienceLab have worked on a variety of medical platforms, including software for physical devices, an online medical portal to provide up-to-date news for medical professionals as well as other web-based content. We are passionate about medical user experience research as this type of research can benefit the treatment and care of patients and support aid to medical professionals.

With the boom of smartphones and a huge array of applications (*apps*) available for downloading, from self help aids, symptom checkers and e-learning for medical professionals, we set out to investigate whether smartphone apps are perceived to be effective learning tools for UK NHS medical students. We also wanted to understand what app features were thought to be engaging and sought to understand the uptake of these apps.

The design of the study consisted of three phases of research with the aim of creating useful guidelines for developers of medical apps. The three phases of the research were:

- **Phase 1:** An online study to explore current user experience, behaviors and preferences of medical apps used for learning. A sample size of 59 medical students took part, and issues such as mobile operating systems, frequency of app usage, ease, usefulness and function were explored.
- **Phase 2:** Of the 59 participants that took part in Phase 1, 6 participants took part in more in depth one-to-one research studies as well as completing a short diary study to record app feedback. During a one-week period they were asked to explore two popular apps (most commonly used by the sample), Epocrates and SkyScape.
- **Phase 3:** The final phase consisted of further one-to-one interviews to discuss any issues faced. During the sessions participants' interactions with both apps were discussed and any issues encountered were demonstrated and explored in detail.

During this research, we discovered that medical students regularly downloaded apps to support their learning and perceived these as valuable resources. Participants found some apps engaging, and then requested more interactivity. Although there were some concerns over the reliability and validity of the information delivered, with some users wanting NHS approved apps. Four themes were identified indicating the user perceived benefits of using medical apps for learning, these were: 1) *Quick access to information and ease of use*, 2) *Easier to carry around than medical text books*, 3) *Good supporting learning aid and finally* 4) *Up-to-date information*. In terms of medical apps, good usability is essential especially for those apps pitched as learning tools. It is not only the content, but also navigating to the right content, that is important.

As a result of this study, the following pages present useful guidelines relating to app development for a medical audience.

For access to the summary article please contact Azia Mughal at ExperienceLab.

App design guidelines

- **Consistent layout:** Ensure there are no unexpected changes from one page to the next unless the end user is requesting a significant change in content. Unpredictable or inconsistent screen layout can slow the user down thus reducing any positive experience.
- **Menu structure:** The main menu needs to have a good selection of over-arching topics. This will benefit less experienced users who may need to drill down to specific topics but require a basic overview.
- **Intuitive design & organisation:** Ensure content is clearly categorised and hierarchically organised so users can clearly view the category they have selected as well as the associated sub heading. For example, this is particularly important when listing medications:
 - ⇒ Drug Name ⇒ Dosage ⇒ contraindications/interactions ⇒ link to more comprehensive info
- **Text size and readability:** End users are typically reading medical content that can be quite dense on a smaller screen, and this can be difficult on the eyes. Ideally, avoid a black background and white foreground text. Instead, the inverse is preferred. Provide users with the ability to rescale text size and font, as they prefer, and provide an option to change the foreground/background text. For example, the Amazon Kindle is a great example of this feature. An app is also available for smartphone's, which allows users to download books to read on to their Smartphone's. The text size and background can be manipulated so text can be read in accordance with the participants' preference.
- **Navigation and option selection:** As these apps are often used on touch screen phones it is important that selectable options can be easily navigated to and selected. For example, when displaying rows of touch button (options) ensure these are of a sufficient size to select, helping users avoid errors as a result of a fingertip overlap from one button/row to the other. In some cases apps have more than one row of options (one on top of another), where selecting the incorrect option can be frustrating especially if it's a continuous issue.
- **Error recovery:** System errors, end user errors, and faults can occur. Providing a useful and clear message to the end user makes a huge difference between a frustrated user and an informed user. Ensure error messages clearly indicate the nature of the problem and provide guidance on what users need to do next. Provide a clear and useful solution.
- **Visual content:** As medicine is such a visual and tactile subject, end users often need to consult detailed anatomical diagrams of different parts of the body. Include diagrams where appropriate, for example, anatomy diagrams (3D when and where possible), x-ray examples. 3D imagery would be very useful, especially if the ability to zoom and pan is also offered.
- **Bookmarking and making notes:** A bookmarking facility to bookmark/save particular content or images would be useful. Creating an area where users can store particular content of interest.
- **Sharing content:** The ability to share content and opinions with peers or even patients would be a useful feature. Social networking sites like Facebook and Twitter are popular means of online social communication and sharing. Other forms of sharing such as comments on blogs and discussion forums are also useful. Linking app content to sharing features may also increase knowledge and visibility of the app.

Content development guidelines

In this section we summarise content, as suggested by our medical student participants.


- **Registration:** When developing mobile apps ensure users are able to select multiple specialties/interests or none at all. Also provide a 'Student' option for those studying and using these apps as an additional aid to learning. Avoid adding to users cognitive load, provide information they can select when possible rather than asking users to enter in information.
- **Native content & language selection:** Content needs to be tailored and reflective of the users country. Medical terms, phrases, and references to drugs need to be localised. For example, drug trade names in the US are different to those in the UK. Users should be able to tailor the app to use UK terms.
- **Links to key resources:** Any form of interaction that reduces the need for user input is welcomed. Links to more comprehensive and related sources were welcomed. Medical students are taught to be objective and use multiple information resources, to avoid bias.
- **Revision and Interactive content:** To enhance a positive user experience and encourage engagement with the app, it would be useful to offer interactive quizzes/tests for users, based on what they have learnt. Revision summaries would also be useful. Some participants liked the idea of using games as a revision tool.
- **Symptom checkers:** Implementing symptom checkers could be a useful training aid and form a dialogue between consultant and student. For example, the user will input patient symptoms and the app will offer diagnostic suggestions that can be discussed further, with provided rationale.
- **Patient Checkup section:** A step-by-step guide on how to examine patients, which also acknowledges sensitivities such as age, culture, bed side manner and so on. This would support the students' confidence in potentially sensitive situations. Also, provide diagrams when referring to specific types of examinations.
- **Intelligent results and access to a wide range of resources:** Ensure users have a wide range of publications/resources they can select from. This is particularly important in the medical field, as end users don't want access to only one particular publication to avoid bias. The information could be provided by the app itself or links that require internet access. This flexibility would provide a more positive user experience.
- **Rotation tools:** Whilst students are training in different departments, it would be useful to provide content to support them during these phases. Category examples for different departments may include: Psychiatry, Accident and Emergency, Pediatrics and include content that is appropriate to that rotation (e.g., for Psychiatry – depression, schizophrenia, personality disorders).

About ExperienceLab

Putting human insights at the heart of design and innovation

ExperienceLab have been studying people, processes and technology for over forty years, and are proud to have some of the best researchers in the business. Our staff are skilled at gathering deep insights from people, based both on their real lives, as well as the views and preferences they express in a lab environment.

Our approach is informed by the expertise built up in the team over decades, and brought to bear on every project. Our work helps to direct strategic thinking, drive innovation and shape the design of new products and services. We call our people-centred research approach, DeepSight, and it draws on the range of techniques below.

DeepSight	ExpertView	LifeView	LabView
	<p>Features: Expert reviews, usability and accessibility audits, competitive analysis and desk research.</p>	<p>Features: Ethnographic field research, informal interviews, diary studies, and long-term observation.</p>	<p>Features: Usability testing, interviews, card sorting, prototype evaluation and user focus groups.</p>

Ethnography at ExperienceLab

ExperienceLab has recently expanded and now has an in-house ethnographic research unit, delivering strategic analysis, actionable insights and recommendations. Ethnography involves spending time with participants in their own contexts, finding out how people are really experiencing and sharing technology. It identifies patterns of behaviour, not just relying on what people say, but also observing what they do.

If you would like more information about ExperienceLab or our ethnographic research, please get in touch:

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