Universal Design for Informal Learning

Position paper

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In Norway, e-inclusion principles are on their way into education through the upcoming government requirement for universal design (UD) of digital educational material and content and technical teaching aids[1]. In contrast to other countries, the requirement not only targets the public but also the private sector, which makes the anticipated impact truly significant.

At the same time, we are witnessing a trend in education, away from formalized learning at established institutions and towards informal settings. You might yourself have watched a short instructional video on YouTube in a commuter bus, played an educational math game[2] on a mobile platform while waiting for the dentist, or learned a new language on the Web[3] at home. In other words, there is a turn-away from the regular curricula to segmented micro-learning in a variety of ways.

At my research institution, the Norwegian Computing Center, we have followed the development on the field of universal design of ICT and its application closely since the early 2000s. We explored for instance both opportunities and challenges with micro-learning combined with UD in a couple of recent research projects.

One case was the development of a digital version of an evening class for relatives and caregivers of dementia patients. The goal here was to create a virtually complete resource, a mobile app, suitable for both lookup and browsing. As it turned out, the entire concept of micro-learning with its format of short informal and slides-like learning units in arbitrary order and quite restricted[4] space for text, graphics, audio, and video was considerably defied by the amount of available information, its hierarchical structure and inherent order, and internal cross-references. It appears to be an ongoing challenge to determine appropriate logical boundaries of content fragments as well as suitable sizes, and how these fragments can be found, presented, and navigated to provide a tailored individual progression of knowledge acquisition.

A similar problem occurred in another project, where we had prepared a mobile app for micro-learning to contain a part of the curriculum in physics for 8th grade pupils, here with special attention for those with reading difficulties. Appropriate in this situation was a successive walk-through of the available knowledge due to its inherent logical order. However, this seemed to be difficult to achieve given the plethora of personalized progression curves as typical encountered in micro-learning.

In one of our current research projects, we are looking at science museums and science centers and the degree of universal design of exhibits. These institutions have provided informal

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[1] https://regjeringen.no/no/aktuelt/innforer-krav-om-universell-utforming-av-ikt-i-utdanningen/id2521801/
[2] For instance one of the Dragonbox apps by WeWantToKnow
[3] E.g., duolingo.com
[4] Some would have said: Twitter-like

learning and micro-learning for quite some time[5], with a hands-on approach and interactive exhibits[6] which are supposed to encourage the visitor to experiment and explore. Science centers aim to support the diversity of visitors in making personal choices about what to attend, what to do, and how to process the provided information. However, as the aforementioned app, also science centers struggle with conceptual coherence; that is, how to communicate abstract concepts and overall themes, clusters of knowledge, and narratives. At the time of writing, it remains unclear how exhibits can support multiple learning styles, multiple intelligences, and the variability in learning in general. In particular, a multitude of options, be it with regard to learning style, content modality, sensory activation, interaction type, and others, will typically be in conflict with the overall goal of simplicity to avoid cognitive overload and confusion, ease orientation, and to support informed decision making. It is also noted that the requirement for support of multiple learning outcomes is, as far as I can see, in conflict with any predefined learning goal as is typically the case today. Yet another dilemma of science museums is the extent of exhibit interaction, which some studies have shown to have a positive effect on learning, while other work can document examples of improved learning with non-interactive installations.

Much of this research is along the lines of what has become known as Universal Design for Learning, or short UDL. While a great deal of previous efforts has focused on how to apply the principles of universal design to museum interactives with the main objective to ensure access and use, UDL goes further and has the ongoing ambition to gain knowledge regarding how to apply universal design in order to create engaging learning experiences for learner diversity. A lot of work remains here, as effective inspiring design is highly non-trivial.

The science center context also nicely illustrates the dilemma that one often has to face when applying universal design principles: What is good for one particular user groups may in fact be in conflict with another group of users. For instance, audio that is essential for low-vision users can be a source for confusion and disappointment for deaf users who are left wondering what they are missing. The overall vision for design to be “usable by all people, to the greatest extent possible”, as put forward in the definition of UD[7], does hence not necessarily lead to designs which are good for all, at least not in a straightforward manner. We believe, however, that universal design is suited particularly well for informal learning, such as in science centers, as these situations often comprise social and concurrent learning of several individuals. Accounting for user diversity and being able to give all equally good learning experiences, regardless of age, ability, background, etc., as UD aims to do, seems to be the best available option.

Let me finish by citing Sue Allan who in 2004 as Director of Visitor Research & Evaluation at the Exploratorium[8], wrote: “In the face of irreducible complexity of both physical systems and humans, we are unlikely to ever create generalizable enough design principles to obviate the need for research, prototyping, and evaluation. Much of this work will require careful and detailed study at many scales if we are to understand the myriad alternative ways in which visitors experience, interpret, and learn from our exhibition spaces”.

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[5] The earliest science center known is, according to Wikipedia, from 1888

[6] On a side note, we argue for that an exhibit should be viewed as self-service machine, and that therefore the Regulation of Universal Design of ICT Solutions should apply to these, too.

[7] https://projects.ncsu.edu/design/cud/about_ud/udprinciplestext.htm

[8] Located in San Francisco (CA, USA)