

Open Education 2030

Call for Vision Papers

School Education

How will the digital textbook of 2030 solve Meno's paradox?

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No doubt, the future digital learning resource will engage the learner in a Socratic dialogue; the challenge is to come up with the roadmap how to get there.

From a learner's perspective, learning is a paradox, first highlighted in Plato's dialogue Meno: How can we seek something we do not know? For thousands of years schools and universities *have known* and told their students so. Educational technologies shifts the locus of control to the learner and might lead to a new era of learning "tailored for and controlled by individuals as they expand their knowledge, fluidly moving across learning contexts, interacting with others" [1]. But how will these individuals learn without being told? Meno asked Socrates: "How will you inquire into a thing when you are wholly ignorant of what it is" – and Socrates answered that the slave boy "will discover by seeking the truth in company with me". What kind of company will the learning contexts of the 21st century offer that will allow the learner to bootstrap the knowledge society?

To be honest, up till now the Socratic dialogue has not been a great feature of formal education. Often the textbook has carried the curriculum and led out the path of learning. The textbook will play an important role in this century, too. But the role will be different, and this vision paper seeks to understand the deep transformation of the textbook when it goes digital and is being projected on any surface anytime and anywhere the learner may be located in 2030.

1. The textbook of today – modelled on paper

Schoolteachers know that the textbook has gone through a thorough process with publishers working hand in hand with expert authors and curriculum committees. If you stick to the textbook as a schoolteacher you are safe; - the learners will pass the exam. Updating textbooks is a slow process. US school leaders are talking about a seven years cycle and are eager to come up with a decision to make a shift to digital textbook now, or they have to wait another seven years [2]. (Within Higher Education, at least at introductory level, textbooks also play a major pedagogical role, giving the structure to the lectures. Here the revision cycle is less important as one textbook could easily be replaced by a book written by another author.)

Advanced graphical design characterises today's paper textbooks which are richly illustrated and structured to expose structure, semantic relevance of different parts of the text, and often enhanced by links to external resources, and by simple assessments at the end of each chapter.

Even if we in 2013 find experiments with dynamic e-textbooks with rich media content and communication with external services, the next seven years will not see fundamental changes. Publishers will insist on formats and technologies that mimic the paper textbook. Valued features are built into the paper book using fonts, graphical design elements, and different types of paper – it is impossible to ignore that people care deeply about century-old print

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traditions. The EPUB3 format, which builds on open web standards and HTML5¹, is just published and hardly implemented in ebook readers even if everybody seems to agree that this is the way forward after EPUB2 became the dominant ebook format (for novels). It needs to be proved that EPUB3, with the style sheets modules, the scalable vector graphics format, OpenType and Web Open Format fonts, and the scripting language, is delivering the same quality textbooks electronically as we are used to on paper.

In 2013 the EPUB3 format already makes it possible to include multimedia formats, interactive parts as well as utilizing just parts of the books – however, it is usually still a monolithic, unchangeable artifacts which has to be used by teachers and learners as-is. From a market perspective, the general ebook market is driven by individuals seeking to harness the mobility and ease of access provided by new mobile devices; however, the forces that shape the e-textbook market are more complex. One thing is what students want; another is the pedagogical consideration of the teachers, school authorities and the universities. Experimentations and deliberations take time, and in the meantime the OER movement is challenging the traditional concept of a learning resource; and the new MOOC movement [3] is questioning the business models of traditional universities. In 2013, the textbook is under siege both from internal and external forces; both the publishers and the educational community seem to be bewildered about the future of the e-textbook.

2. The dissolved textbook of 2020

The dissolution of the textbook as an embodiment of an educational unit (think “Algebra”, “History”, “English”, etc. and the traditionally associated textbook), both for schools and higher education happened earlier than expected in 2013. For the universities, it was the explosion of MOOCs (Massive Open Online Courses) that all of a sudden made open content a necessity for course design. An abundance of content of a finer granularity than a whole course or a whole book made the concept of a book redundant. Very early it became clear that EPUB3 allowed pointing to any item within an e-Textbook, and that the question of using chunks of a book in different contexts was more about the business models of the publisher than technical barriers or answering to the needs of the learners.

A new empowering learning design tool

Some new open source software contributed to this development, empowering the teachers as content curators. New learning design tools made it easier for the teachers to draw lines between knowledge structuring elements (curricula and lesson plans, competency frameworks, learning outcome descriptions, etc., – cf. the CEN InLOC specification²), their personal toolkit of pedagogical methods, and the learning resource. In 2020, the teachers no more need the textbook to provide the structure to the course or subject they are teaching. The personal learning design tool knows the courses Ms. Hansen teaches and the courses’ educational contexts due to the new curriculum, competency and learning outcome interoperability standards published as European norms in 2015. She also has a good grasp of didactical patterns that is used in her community of practice. The magic happens when the tool points to a learning resource. Then Ms. Hansen sees how well it fits with the curriculum, how it is been used by her fellow teachers; and she gets indications of the quality of the resource, suggestions of supplementary resources that could serve the full range of her student group, e.g., students with special needs, etc. Content curation is now a well-integrated part of the teaching practice, and there is no need to lean on static structures built into textbooks.

¹ <http://www.w3.org/TR/html51/>

² <http://wiki.teria.no/display/inloc/Home>

The new market of 2020: A peaceful co-existence of OER and commercial content in a service industry

A big disruption was caused by MOOCs in Higher Education (and in the meantime even some real open approaches emerged in that field). For schools, the book as unit of sale was kept a bit longer, but also here the impact of the OER was so strong that the concept of a monolithic textbook was dropped. Teachers are now free to choose their initial and additional materials. Each teacher (and learner) has an annual budget as part of tuition revenues to get the best available resources fitting their learning styles. The publishing industry still produces high quality top-end modules but teachers and learners can use, modify and combine as it fits their context. New services have created new business opportunities around quality assurance, market place, content discovery, and content aggregation.

EPUB3 a website in a document

The learning design tool Ms. Hansen is using is able to package the learning material in EPUB3 format, which is able to deliver a website or an app) as a document. Thus, the learner has access to rich content, either online or offline. Ms. Hansen's own ideas of structuring and sequencing of the particular subject, question and tests, additional learning material, etc. are clearly represented in the publications. Towards 2020, more and more collaborative services were added to the e-textbook readers which allowed the learners to share annotations, report their results to external services and get back data they could use to align their learning with the expectations of their teachers and the practices of their fellow learners. The e-textbook readers supported also the learners' accessibility and usage preferences, adapting the learning material in ways that often surprised Ms. Hansen. She did learn quite a few new aspects of the subject she taught, thanks to her students reporting what their e-textbooks came up with.

3. The role changing e-textbook of 2030

Ten years later, Ms. Hansen is still a teacher in secondary education, but her role has changed. Now she works with individual students who have asked for help or whom the learning support system has assigned to her. Sometimes she feels like a fifth wheel on the waggon; there are so many automatic processes now supporting the learning work of the students. But she knows that sometimes the role of Socrates needs to be acted by a human being, Ms. Hansen.

Changing paradigms – from availability to filtering and organizing information, knowledge and skills.

E-textbooks have already been available on many different devices for many year but now a change of paradigms is mainstreamed – basically any object and any place offers many e-textbook parts as ambient services – the internet of things allows each table to provide personalized information whoever is sitting around it. Field trips and basically any life situation have become learning adventures as 1) all information is available through ambient learning opportunities, accessible and storable as individual e-textbooks; 2) all experiences of learners are captured by wearable devices; 3) anyone can connect dynamically; and 4) anyone can share experiences with their peers in real time. This technology-shift has also led to new challenges and key competences – information, communication and contact filtering have become learning outcomes in primary school. Organizing, filtering and assembling meaningful information and knowledge and building individual competence profiles have

become the key in education. Ms. Hansen helps, records, and discusses which learning opportunities are to be chosen by each pupil and how groups fit together.

An adaptable learning system

What started as an e-textbook in 2013 has developed into an adaptable learning plug-and-play system where the learners' devices are connected through the cloud to systems used by other students, teachers, schools, content providers and society at large. Looking at the evolution of this system the following steps seemed to have made an impact:

- Within 2020 all educational publishers had adjusted their business models so the textbook as a commercial unit ceased to exist, leaving the field open to educators to mix and match content to serve their pedagogical ends.
- Just after the new e-textbook format was published, it became clear that all content within a package could be referenced and pointed to from external services. A reporting API was developed allowing communication between and about every single asset of an e-textbook and services that started to be developed by third party companies.
- Within 2020, all the educational “structuring” information was fully integrated in the e-textbook. The manifest file of the e-textbook could hold information about relationships to curricula, competency frameworks, learning outcomes, etc. - and their alternatives. This enabled all kinds of adaptations based on thematic perspectives, usage profiles, co-learner interaction, just-in-time requirements from knowledge contexts, etc.
- Within 2023 advanced formative and summative assessment services were available from any assessable chunk of content. Advanced caching made these services available to the learner also in offline mode.
- During the years 2015 - 2030 learner analytics data became the game changer, as these data became massively and openly available for use within most learning support tools.
- Key technologies have changed learning opportunities, learning experiences and how they are organized and shared. Learning is more interactive, group-oriented and learner centered than ever. But: The next generation of learners is coming...

To seek the truth in company with...

So, how did this development solve the Meno's paradox? Would the e-textbook of 2030 be able to assess the Zone of Proximal Development [4] so that the appropriate next learning challenge could be presented? First, the combination of new technologies, new formats and new tools have dissolved the boundaries between learning materials and learning activities. The e-textbook (not recognisable by a 2013 learner) and the learning activity, e.g., dialogue with fellow learners or the knowledge field, are one coherent resource for learning. Second, the tracking of your learning activity covers much more than assessment results. Eye movements and other bodily reactions are available as data, and so are live recordings of conversations with fellow learners and mentors. These data are accessible for learning analytics and the results come back as very targeted suggestions for new tasks, new material, new directions, new collaborative activities, etc. raising the bar just so you are able to take the next step towards your learning goal.

The system will never be perfect, and there will always be the need for a teacher or someone to “seek the truth in company with”. But for the average self-organising user, structured learning is also feasible with the 2030 generation of digital textbooks.

- [1] Isobel Falconer, Allison Littlejohn, Lou McGill (2013) *Fluid learning: vision for lifelong learning in 2030*, available at <http://blogs.ec.europa.eu/openeducation2030/vision-papers-on-open-education-2030-part-1-lifelong-learning>, accessed 2013-04-09
- [2] Fletcher, G., Shaffhauser, D, & Levin, D. (2012). *Out of Print: Reimagining the K-12 Textbook in a Digital Age*. Washington, DC: State Educational Technology Directors Association (SETDA)
- [3] Europa Press releases RAPID (2013) *Vassiliou welcomes launch of first pan-European university MOOCs (massive open online courses)*, April 2013, see http://europa.eu/rapid/press-release_IP-13-349_en.htm (accessed 2013-04-23)
- [4] Vygotsky, L. S. (1978). *Mind in society, the development of higher psychological processes*. Oxford: Harvard University Press.