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Informational globalisation has generated changes in all aspects of textbook theory, including the use and development of the digital textbooks. Postmodernist thought has found grounding in the insights of chaos theory, Gödel’s theorem, catastrophe theory, quantum mechanics, emerging cosmological insights, and topology theory. Technology jumps from the margins of education to the mainstream, from informal settings to formal ones and from small independently-funded projects to large-government supported initiatives, where the postmodernism values are accepted. Thus, digital textbooks are widely used in all educational systems. Despite global challenges, teachers continue to be the main pillars of education. “Equitable, Quality Learning for All is a Dakar Consensus” (Anderson & Winthrop, 2013). This implies improving access to quality use and development of digital textbooks. While digital giants (Intel, Apple, Google and others) think about digital textbook use and development only as a technology, students prefer to fulfill certain informational and emotional needs more reliability in their own learning space. Thereupon, only few studies are available to stress the importance of the psychological and pedagogical considerations in digital textbook use and development.

In the past five decades, two development have brought textbook theory issues to the fore. First has been the increased dependence of pedagogical resources and learning tools on Information and Communication Technologies (ICT). Second, abetted by ICT, the didactic model of textbook has been transformed. Today, digital textbooks are used and developed in the most countries around the world. Among the reasons which influenced these processes are the lower cost of the digital textbooks; the availability of content; student buying and sharing trends; the continued growth of for-profit institutions and online learning; the increased popularity and availability of open digital content; an increase in digital-first publishers and open textbook movements; the textbook rental market; the growth of online retail and distribution options; the popularity and evolution of tablet devices and smartphones; the advance of e-reader software/hardware technology; format standards for digital textbooks and the growth of e-book market share in trade publishing, as was noted by Reynolds (2011, pp. 180-184).

Research in psychology and pedagogy has highlighted the relation between an informational-energetic potential for learning and the “offers” of educational technology to improve students’ learning. Changing learning environments and developing technologies of programed, multimedia, hypermedia, eTextbooks and Open Source Textbooks indeed poses a number of challenges for maintaining good practice for learning. Across all discussions, there is a debate about balancing psychological and pedagogical efforts in digital learning. It is clear that a digital textbook didactic model must reflect insight and deeper learning based on behavioral actions and/or activities. Striking the balance between theory and practice
in digital textbook use and development is one of the critical questions. Other tasks are simple, but not less important. For example, copyrights and plagiarism are among the world’s problems. Thus, without the frontier research in pedagogy, these issues will never be solved. It is therefore necessary to review some of key concepts of modelling digital content, its structure and functionality.

THE CHALLENGES FOR THE DIGITAL TEXTBOOK USE AND DEVELOPMENT

Each generation of textbooks’ methodology addresses the challenges posed by the previous generation. In postmodernism, people have been fascinated with the idea of exploring new didactic models of textbook since the beginning of new knowledge conceptualization. Thus, postmodernism values the writerly text instead of readerly text; the mechanism for the production of knowledge derived from a dialogue pedagogy instead of narrative knowledge; quantum relativity instead of Newtonian mechanics; qualitative methods instead of quantitative methods and others, as was identified by Milovanovic (2014). Moreover, teacher-centred technologies are abominated in favor of learner-centered learning strategies. Education occurs in a variety of formal and non-formal settings allowing feedback to come from “local and real, global and virtual learning environments” (Midoro, 2005, p. 32). Unfortunately, the literature notes a number of theories relevant to digital textbook used and development. Their findings hold promise for innovative digital textbooks learning environments, but from theoretical and empirical models. And any attempt to deal with the issue of theoretical and empirical models demands an adequate understanding of the challenges that exist in the Era of Informational Globalisation and Postmodernism. Such challenges can be classified into three main categories:

- The challenge of losing a generation of artificially designed closed pedagogical systems in favour of much more natural, ubiquitous and sustainable environments with local and global, real and virtual learning environments where students are able to self-regulate their learning;
- The challenge of GAE (Globalisation, Anthropology and Existentialism) paradigm, instructional dynamic and flexible strategy, educational methodology and procedures that adequately reflect the postmodernism features and new design of globalised learning processes;
- The challenge of “digital textbooks” that are coming into global market, claiming the need to offer a textbook conceived with the digital language of the multiliteracies, offering innovative pedagogical methodology better suited for the psycho-pedagogical characteristics of the young.

Numerous studies have indicated that is a problem in managing artificially designed closed pedagogical systems especially with respect to regulating the learning needs in diversity of learning environments. Research has shown that

...further in-depth studies are required to determine the conditions and features that users will yield positive learning results. Currently, findings on user acceptance and effectiveness are generally contradictory. While some studies on user acceptance claim that students and teachers do not prefer e-Textbooks, other studies reveal that users express satisfactory perceptions on the use of e-Textbooks over printed books. Preliminary investigation indicates that if the functions of e-Textbooks are well designed, the results of user attitude and behavior toward the use of e-Textbooks relative to traditional paper textbooks will be more encouraging. (Gu, Wu & Xu, 2014)
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There is also the challenge of establishing a new knowledge paradigm, learning strategy, educational methodology and procedures that adequately reflect the postmodernism features and new design of globalised learning processes. Such challenges exist in a multidimensional learning space and run the risk of using digital textbooks as no more than a digitalized version of printed textbook. First at an intellectual, emotional and informational-energetically student levels where it is increasingly becoming difficult for the instructional designer to develop appropriate user interfaces. Second at a real environment level, where it is becoming difficult to rely on traditional didactics to regulate behavior during formal, informal and non-formal education in rapidly changing learning environments. Clearly there are a number of pedagogical situations where it is important to use Skinner’s Theory or Multimedia Learning Theory in order to keep attention on and reinforce meaning of key curricula concepts. There are perhaps a number of other real world tasks where severe feedback control may not be the best solution.

Another challenge in the use and development of digital textbooks is related to digital textbook availability at the world level. Different types of eTextbooks and Open Source textbooks, from digitalization of learning content to utilizing interactive technologies are developed. Psychological and pedagogical concerns resulting from either the inability to affordances of such resources/tools or to specify the role of frontier research in area of pedagogy. It is indeed a challenge when dealing with global market of digital textbook use and development pedagogy and methodology. Recently literature points outs the most relevant aspects of digital textbook learning environments: intellectual autonomy, ownership of self-directed learning processes, curiosity and exploration as a natural learning mechanisms, freedom of choice, diversity, flexibility and virtual mobility, multi stimuli exposure, connectivity and personalization. What are the most relevant pedagogical strategies for digital textbooks?

SEARCHING FOR A SOLUTION

The speed of challenges emphasizes that digital textbook isn’t only an apparent phenomena, but something more that is the essential in future rounds of sustainable and durable development of human society. However, is it the greater reliance on digital infrastructure and learning platforms, even digital, in real environments? Is this statement true: “textbooks are undergoing a transformation into digital textbooks, which can offer a diverse range of supplementary digital media functions including sounds, audiovisuals, animations, 3D graphics and other state-of-the-art multimedia features” (Kim, Yoo, Park, Yoo, Byun, Cho, Ryu & Kim, 2010, p. 509)? From one point of view, this is an anthology for anyone interested in how students lean in the digital/information age. From the other point of view, this is an invitation to cross-disciplinary research.

Many innovations are around modern psychology and pedagogy. Among them are MOOCs and blended and flipped learning. However, this is only the tip of the iceberg. The increasing interest in psychological and pedagogical innovations is influenced by additional affordances of textbooks and with the increasing popularity of Open Source Textbooks. Use and development of the digital textbooks represent a strategic trend for learning (Davidson & Carliner, 2014; Evans & Rick, 2014; Panto & Comas-Quinn, 2013; Harvey, 2011; Pullen & Cole, 2010; and Kim & Jung, 2010). The meta-analysis of this literature allows coinciding that from a student’s perspective to read in a portable format is more convenient, but not knowledgeable and from a teacher’s perspective to have access to more pedagogical resources/tools means to have more resources and tools for better educational outcomes.
Despite the growing popularity of postmodernism philosophy and digital textbooks’ use and development, a digital pedagogy is yet to be articulated. Leibovici, Bosova, Avdeeva, Rabinovici and Tarasova (2012, p.17-18) witness the following psychological and pedagogical concerns: a) difficulty of understanding; b) disconnected numbers, syllables or words; c) meaningful memorization and d) contextual surrounding of the basic information. How can these concerns be investigated? Could be the same research methodology be applied that has been built since 1960? (Talizina, 1969; Galperin, 2000). It is evident that cybernetic principles cannot be mechanically transmitted to didactic processes that triggered digital textbooks and that learning aren’t t algorithms that lead from simple to complex.

During learning with digital textbooks students need to be actively engaged in processing, storing, and recovering information, as well as critical thinking and decision making processes. Since 2000 more and more publishers have developed digital textbooks and allow to construct, or/and to self-publish digital textbooks. Other companies serve as an intermediary between publishers and students, delivering the textbook in a digital format using a program for reading. In short, digital textbooks with personalized content, interactive assessments, and mediated communication provide new pathways for learning design.

Digital textbook use and development combines the power of technology with creative, innovative and metacognitive strategies. However, the multiliteracies’ needs and real environments tasks require alternative psychopedagogical solutions. There are at least twelve issues, which need to be solved:

- To identify good practices of psychological and pedagogical considerations in digital textbooks’ use and development to substantiate digital learning with textbooks;
- To discuss digital textbooks’ terminology and to classify its diversity;
- To operate with post-modernism philosophy in order to investigate the effects of Globalisation and ICT) related to learning ideal for new educational endeavors;
- To illustrate the diversity of principles in digital textbook use and development in order to demonstrate the power of cross-principles and those norms of application in learning design;
- To differentiate digital textbooks’ affordances for eight didactic systems and to identify the main features related to information/communication, learning and assessment models;
- To identify the psychological and pedagogical solutions related to elementary didactic units;
- To analyze and compare the psychological and pedagogical functions of modern teachers that could be delegated to digital textbooks in order to archive the guaranteed learning outcomes;
- To assemble the cross-principles in a new Didactical Model of Digital Textbook;
- To summarize the learning design norms of elementary didactic units common for all digital textbooks related to assessment, development and maintenance of learner’s cognitive potential;
- To synthesize a model of integrated process and to prove information/communication, cognitive activity and assessment processes in digital textbook use and development;
- To summarize digital textbook’ technologies and to explain the role of MetaSystems Learning Design in the ecology of learning in formal and non-formal learning environments;
- To argue and predict the features of quality indicator required by formal and non-formal, open and closed learning environments provided by the digital textbooks;
- To summarize the effects of digital plagiarism and the ways to avoid it.

All these twelve issues indicate the research problem: What are the psychological and pedagogical considerations that would cause innovative digital textbook use and development for sustainability?
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The Era of Globalisation is shifting emphasis from Bacon’s “knowledge itself is a power” to new learning ideal: *professionalism, planetary thinking and cultural pluralism*. Although many researchers, teachers and practitioners adopt this, they only tend to be more adaptive and accommodative at global challenge of using and design of digital textbooks. In practice, this is over-formalized, based on new technology, but with historical solutions software development. Such, for example is ADDIE models, used since 1960, in instructional design. Usually, these ill-conceptualized softwares have followed incorrect decisions about how digital textbook should be used and developed.

The questions listed above represent the main tasks attributed to theory and practice of textbook’s use and development. One of the research directions named “MetaSystems Learning Design” was launched in PhD thesis “Psycho-pedagogical foundations of electronic textbook development”. In recent positions, papers related to this thesis described the “modern pedagogy features in multi-measured space” (Rudic, 2013, p. 74); cross-principles (Ralean, 2012, p. 242) and a knowledge management model (Ralean, 2013a); and interdependences between MetaSystems Learning Design cross-principles and the diversity of learning environments (Ralean, 2013b, 2013c). This innovative way offers solutions and recommendations in using and development of digital textbooks, emphasizing the role of post-modernism in educational philosophy, as well as principles derived from quantum and behavioural psychology, cybernetics of Open Systems, competence pedagogy, and knowledge management.

This book highlights cross-principles and seeks for innovative solutions regarding psychological and pedagogical considerations in use and development of digital textbooks. *The aim of this work is to offer a balanced coverage of related technologies that could contribute to digital textbook design focused on guaranteed learning outcomes*. Thus, the integrity of information/communication, cognitive activity and assessment mechanisms helps identify and fortifies the linkages between digital environment and learning processes. Moreover, with an emphasis on the synthesis of a new didactic model, this book addresses to usability, affordances and learnability of digital textbooks.

Establishing the cross-principles on the base of “globalised learning processes”, allows identification of laws, which are considered the first step leading to a pragmatic solutions. These principles take the form of norms for developing elementary didactic units. Either the teacher(s) or/and student(s) should be learning designers. Thus, the main condition for digital textbooks to be accepted is deeper learning. The proposed way is to use instructional dynamic and flexible strategy. Moreover, teacher(s) and student(s) play an important role in this strategy. This concerns the quality indicator in one or other environment. However, if this issue is analysed toward affordances, the focus needs to shift to developing an integrated structure of competence where the cognitive system(s) of the student(s) is the one who makes the most relevant decisions regarding what knowledge/styles is needed and in what environments. This not only moves the teaching strategies from reproductive to productive, but also ensure critical thinking about what is proposed in textbooks and what is really important for learning in a challenging environments.

The idea to diagnose psycho- pedagogical characteristics of learners before learning with software is not new. We keep this idea in our theory. In addition, it was observed that most of the proposed models describe the limited roles of teacher(s) in personalised “construction” of the content (Hong, Kim & Yoo, 2013; Zoellner & Cavagnaugh, 2013; Armen & Atwoo, 2013; Lee, Messon & Yau, 2013). Apparently, the lack of meta-analysis results in increasing the probability of errors in digital textbook learning environment. Thus, this is an absolute necessity for innovative modelling.

Linear and systemical approaches in conceptualization of digital textbook(s)’ use and development has also been considered as precursors of an ineffective digital learning environment, thus leading to conclusions that students prefer digital textbooks, but learn better or at the same level with printed text-
books because “on-screen reading is slower, more fatiguing, and non-comprehensive” (Wook, Michaels & Waterman, 2014, p.17). Since the learning environment provides unique solutions for architecture of integrated structure of competence, the importance of clarity in digital textbook design cannot be overstated. The proposed solution doesn’t neglect the correlations between the diversity of learning environments, learners’ potential and teachers’ functions. Moreover, it is expected that Metasystems Learning Design is a post-modern solution, because it is based on the knowledge graph and adequate matrix, as well as on interactive and delayed feedback, integrity of information/communication, cognitive and assessment processes, and learning and behavioral actions. This allows evidencing the priority of educational outcomes based on deeper learning. In practice, this norm requires a hermeneutic dialogue between author and reader of the digital content and a new didactic model.

Analyzing digital textbooks’ features in compassion with functions of teachers, it has been identified the possibilities to delegate at least six psycho-pedagogical functions of innovative teachers: information, formation, systematization, integration, cognition and self-regulation. Through promotion of “integrated flexible structure of competence” architecture, the importance of action verbs related to cognitive, affective and psychomotor activities is undisputable. This insight opens a new way for digital textbooks adoption in diversity of learning environments. Self-regulation, personalization, clarity, dynamicity and flexibility, feedback diversity and ergonomics are the keys of learning design. The meta-analysis of scientific literature and practical examples allow summarising the psycho-pedagogical norms for designing the didactic units related to teaching, learning and assessment. These norms are valid not only of their attachments to some theoretical trends or to a concrete theory, but because they are the sufficient and necessary conditions for modelling of functional learning environment. Educational technology, defined as the learning design plus personal development, represents a new culture of learning. Hence, the technological phases within the didactic model argue an innovative ecological approach, but instead reflect the main conditions for a sustainable digital textbook learning environments. All these solutions are reflected in the “quality indicator” and technology of digital textbooks.

ORGANIZATION OF THE BOOK

The book is organized into twelve chapters. The best way to read these chapters is the following (see Figure 1).

A brief description of each of the chapters follows:

Chapter 1 identifies four good practices to substantiate digital learning with digital textbooks: visual instruction, audiovisual instruction, programmed instruction and computer aided instruction assessment. This chapter emphasizes the effectiveness of practices and concludes with a call for the future research in confusing terminology proposed during digital textbooks’ use and development.

Chapter 2 summarizes the digital textbook affordances, i.e. the proprieties of digital textbooks to do what they enable to do in learner-centered learning environments related to content, feedback, social media, and desired results. The author classifies the current and future features into 8 didactic systems and identifies the main characteristics related to communication, learning and assessment.

Chapter 3 establishes the need for a comprehensive definition, as well as terminology related to digital textbook use and development. The author provides a framework for clarifying diverse initiatives, exploring correlations between textbook, digital (text) book and educational software concepts and proposing a synthetic definition, derived from formal logics.
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Figure 1. The organizational structure of book

Chapter 4 presents an analysis of issues, controversies and concerns related to diversity of eTextbooks and Open Source Textbooks structures. The author identifies the common components of digital textbooks and reports them to their external and internal context. The author contends that in order to design and develop an effective structure for digital textbooks, one needs to consider the post-modernism, metacognition, feedback, competence pedagogy and knowledge management solutions.

Chapter 5 analyses the recent psycho-pedagogical functions for use and development of digital textbooks: information, formation, systematization, integration, cognition and self-regulation. It promotes the concept of integrated structure of competence that opens the way to move beyond a digitalized version of scholar print textbook toward knowledge-based-economy requirements.

Chapter 6 takes a philosophical orientation and investigates the effects of Globalisation and Information and Communication Technologies (ICT) related to learning ideal for new educational endeavors. The aim of this chapter is to elucidate the importance of challenges for teacher(s) and student(s)’ role and features a meta-reflective discussion about laws of globalised pedagogical processes and influence on psychological and pedagogical consideration in digital textbook use and development.

Chapter 7 reviews the principles of digital textbooks’ design models such that thrust could be promoted in an interdisciplinary domain. The finding of this chapter is that digital textbooks need to be designed and used on the base on the following cross-principles: self-regulation; personalization; clarity; dynamicity and flexibility; feedback diversity; and ergonomics. These principles are accomplished with adequate norms of application in learner-centred learning environments.

Chapter 8 addresses the issues of Instructional Design, with particular reference to Instructional Systems Design, ADDIE and Agile models. Based on results of the pedagogical experiment, the author proposes a new didactical model that reflects both the learning design of digital textbook’ context, content, environment and cognitive processes triggered by digital textbook.

Chapter 9 reviews issues surrounding the learning design of elementary didactic units common for digital textbooks. The author argues that it is possible to maintain and increase the cognitive potential
of the learner with a self-regulated mechanism and hence facilitate cognition and metacognition. The author argues that the learning design of elementary didactic units should ensure the cognitive, affective and psychomotor affordances of a digital textbook.

Chapter 10 discusses generic concepts related to pre-assessment, formative and summative assessment and their roles to digital textbook structure. The author discusses the concepts of monitoring for anomaly detection systems in developing the integrated structure of competence focus on education outcomes and/or self-regulated learning through ICT in learner-centred learning environment, if integrity of information/communication, cognitive and assessment processes is to be maintained.

Chapter 11 presents the notion of technology and quality indicators. The author, following their identification of concerns related to digital textbooks used and developed as pedagogical resources, identifies the role of educational technology can play in ecology of learning. It is concluded with presentation of quality indicator necessary for digital textbook use and development.

Chapter 12 presents the notions related to digital plagiarism and the ways to avoid it for proper use and development of digital textbooks. It concludes that plagiarism is a big and complicated issue. The main part pf the chapter is dedicated to a discussion of ISBN and eISBN.

The target audience of this authored book are professionals in digital textbook theory and design. This work is a culmination of 10 years of research in interdisciplinary and trans-disciplinary areas of digital pedagogy. The book is expected to appeal to researchers in frontier investigations related to modern pedagogy but also to anyone who is interested in understanding the theme of digital textbook use and development from a metasystems learning design perspective. For a long time, the author has concentrated on different aspects of psychological and pedagogical concerns and innovative solutions in digital textbook use and development. Therefore, the author has published over 70 other publications on various aspects of learning theory and design, including the role of cognitive, quantum and artificial psychology, competence pedagogy, constructivism cybernetics and other concepts discussed here.

Elena Railean
University of European Studies, Republic of Moldova & Academy of Sciences of Moldova, Republic of Moldova

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