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HTML5 SUPPORT IN MOBILE LEARNING TOOLS

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Abstract: *Considered a new concept until about a decade ago, mobile learning (mLearning) is now regarded as a natural and, in some circumstances, an essential learning technology. The key factors that made this development possible are the continuously decreasing prices and increasing capabilities of the mobile devices and infrastructure, as well as the growing need to be connected and learn anywhere and anytime. The great variety of mobile devices leads to various issues. One of the main technical issues is the need to make learning content available for different devices, which may be a costly and time consuming process. One increasingly popular technology for creating cross-platform content for mobile devices is HTML5, the latest revision of the well-established HTML standard. The purpose of this paper is to present the results of a research on the HTML5 support in selected mLearning tools.*

Keywords: *Mobile learning, mLearning tools, HTML5*

I. INTRODUCTION

Through the years of its development the term *mobile learning (mLearning for brevity)* has been defined in various ways, in respect to the changes of its accent from the technologies to the learner [1, 2, 3, 4]. According to its first definitions mLearning is limited to learning with the help of mobile devices and some of these definitions suggest a maximum size of a device in order to be considered mobile [5]. With the change of the accent towards one on the learner, the key criterion for mobility became the learner's mobility and in most of the definitions what is essential is the learning independence from time and place, not the usage of mobile devices. It was soon realized that though not compulsory, namely the mobile devices make the learning really mobile, so the definitions used today always include their usage in one or another degree. One definition of mLearning that is often used in the last few years [1, 3, 4], is the following: "*Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies.*" [6].

1.1. A brief history of mobile learning tools

In 2001, the year when the first European project dedicated to the mLearning was launched, using mobile devices for learning was regarded as "highly innovative and unusual" and the concept of mLearning was barely known [7]. Four years later, the mLearning was still described as "a new concept" [8], "difficult to define, conceptualise and discuss" [9], but also as "growing in visibility and significance" [9]. Several facts proving its growth in these years can be mentioned – about 10 conferences, seminars and workshops were launched, dedicated especially or mostly to the mLearning [9] and about 5 institutions, 15 journals, 15 specialists and 15 projects, researching the mLearning in a significant extent can be enumerated [10]. The reason these five years were reviewed in the first place is that namely in them the first software tools for creating, distributing and managing learning content for mobile devices were developed, which clearly shows that the need of such tools has been quickly realized in the first years of the mLearning growth [11].

The penetration of mobile devices in the next years was constantly deepening – the global mobile phone subscriptions has increased more than 5 times – from under 1 in 2001 [12] to 5 billion in 2010 [13] and the mobile data traffic in 2010 – 237 petabytes per month – was about three times the size of the entire global internet traffic in 2000 – 75 petabytes per month [14]. This penetration, combined with the increasing number of features and the decreasing price of the mobile devices, as well as with the growing need to be connected and learn anywhere and anytime lead to considerable progress in the mLearning field [4, 15]. On its part, this progress boosted the development of tools for rapid and easy creation, delivery and management of learning content for mobile devices [15]. The different operating systems, web browsers, screen sizes and other features, used by the mobile devices – i.e. the different platforms – make it difficult to define standards for development of mLearning content [4], thus demanding it to be independently developed for every platform it will be used on. However, at least in most cases, this is a costly, time consuming solution. In order this issue to be overcome, the development tools should be able to publish learning content in formats, accessible to numerous platforms.

1.2. The HTML5 stack

One increasingly popular technology for creating multiplatform content for mobile devices, especially for the quickly growing number of smartphones and tablets, is HTML5, the latest revision of the well-established HTML standard [15, 16, 17]. HTML5 is often used as a shorthand of the term HTML5 stack, which includes two other technologies, except HTML5 itself – CSS3, the latest revision of Cascading Style Sheets, and the programming language JavaScript. The features provided by the HTML5 – placing animations, audio and video, drag and drop, geolocation, etc. – do not require plugins unlike Adobe Flash Player and Silverlight, two commonly used technologies for mLearning content development. There are two main concerns in using HTML5 for delivery of mLearning content – the need of HTML5-compliant browser and the need of mLearning development tools supporting HTML5 [17]. The latest versions of the commonly used web browsers already support most of the HTML5 specification and their new versions, developed on a regular basis, will support it more and more fully. In the last year not only the web browsers has added and improved the HTML5 support, but also the tools for mLearning content development, distributing and managing. The purpose of this paper is to present the results of a research of the HTML5 support in several mLearning tools, selected by leading mLearning specialists.

II. SELECTION AND CLASSIFICATION OF MOBILE LEARNING TOOLS

In a recent publication of the Advanced Distributed Learning (ADL) Co-Laboratories, mLearning tools are defined as tools “that are *specifically designed for mobile learning (mLearning)*” [18]. Other authors include in the definition not only such tools, but also tools not particularly intended for mLearning, i.e. tools for general purpose mobile content development, delivery and management [4, 11, 15]. That is why they refer to the tools specifically designed for mLearning as *mLearning content creation and authoring tools*. For the sake of brevity, *the ADL definition is used in the paper*.

mLearning tools can be classified in different categories, depending on their purpose and the features they provide [4, 11, 19]. The criteria/categories used in these classifications are presented in the following sub-chapter in alphabetical order of the names of their authors.

2.1. Existing classifications of mobile learning tools

The ADL [19] classifies the mLearning tools on the basis of numerous criteria, grouped in six main categories: *Mobile Category*, including the types of tools based on their purpose; *Targeted Role*, classifying the tools according to the roles in the mLearning implementation they are targeted; *Platforms Supported*, in which the supported mobile operating systems are shown; *Features Supported*, enumerating the key capabilities of the tools; *Licensing Options*, describing the tools pricing; *Delivery Options*, in which the ways learning content is delivered can be found.

Mugwanya & Marsden [11] also use various criteria to classify the mLearning tools. These criteria are grouped in three broad categories: *Technology*, in which the main technological features of the tools are listed; *Pedagogy*, showing the tools support for learning objects standards and different learning styles; *Usability*, classifying the tools by the user friendliness of their interface and the support for people with disabilities.

Woodill [4] sorts out mLearning tools in four categories based on their features and complexity: *mLearning Utilities* – low cost or free entry-level products, taking several hours to achieve results in early stages of mLearning implementation; *mLearning Authoring Tools* – budget software solutions, taking at most a few days to be mastered, and used for designing, creating, testing and delivering mLearning content; *mLearning Platforms / Solution Providers* – advanced software systems, providing support in all stages of mLearning implementation, not only in those concerning the learning content – design, creation, testing, delivery, assessment, management, security, etc. As expected, these tools are expensive and their use is appropriate mainly for organizations with significant mLearning needs; *Assessment & Survey Tools* – these software products are dedicated to the assessment / surveying of the learners. Except for these categories, Woodill mentions one more – *Conversion Tools*. It includes supporting tools, used for conversion of learning content for one platform / operating system to such for another.

2.2. Selection of mobile learning tools supporting HTML5

The main sources used for selection of mLearning tools with HTML5 support are two of the classifications already presented in the previous sub-chapter – the ADL website [19] and Garry Woodill's book [4]. They were selected because they are authoritative, up to date and classify a significant number of tools. The complementary sources are four [20, 21, 22, 23] and are used for two reasons – some tools not included in the main sources are presented and an information is provided for some tools enumerated in the main sources. Every mLearning tool in the sources was checked for HTML5 support and those with such were selected: Achieve Labs Inc. – LearnCast; Articulate – Storyline; Blackboard – Mobile Learn; BlueTech, LLC – BlueVolt mLMS; Chalk Media Corp. – Pushcast; CM Group – Luminosity Studio; datango AG – datango Knowledge Suite; dominKnow – Claro; Harbinger Knowledge Products Pvt. Ltd. – Raptivity; Hubflow – hubflow; Impatica – OnQue; Intuition – Rubicon; mobil21 – Mobil21; Moofwd, Inc. – Mooestro; NetDimensions – mEKP Live 7.1; NexLearn – Simwriter; OnPoint Digital, Inc. – Cellcast Solution; OutStart – Hot Lava Mobile; Qstream – Qstream; Questionmark Corporation – Perception; Rapid Intake, Inc. – mLearning Studio; ReadyGo Inc. – ReadyGo WCB; SumTotal Systems, Inc. – ToolBook; Trivantis Corporation Inc. – Lectora Inspire; Udutu – myUdutu; Vcom3D, Inc. – Vcommunicator; Xyleme, Inc. – Pastiche.

The above selection was then refined by considering only the tools with sufficient information for their HTML5 support. They are listed here in *alphabetical order of their vendors* (as in the classification on the ADL website): *CM-Group Ltd* – Luminosity Studio 2.9.4.20010 [24]; *dominKnow* – Claro 6.12.0113 [25]; *Harbinger Knowledge Products Pvt. Ltd.* – Raptivity 7.0 [26]; *Rapid Intake, Inc.* – mLearning Studio [27]; *ReadyGo Inc.* – ReadyGo WCB 9.0 [28]; *SumTotal Systems, Inc.* – ToolBook 11 [29]; *Trivantis Corporation Inc.* – Lectora Inspire X.6 [30].

2.3. Classification of mobile learning tools supporting HTML5

As this paper is targeting the HTML5 support of the mLearning tools, only their HTML5 features will be used in the classification. These features represent the main HTML5 capabilities, used in learning content development (enumerated in alphabetical order): *Audio & Video*, *Drag & Drop*, *Geolocation*, *Graphics & Animation* and *Offline Storage* [16, 17]. The classification is presented in the chart (HTML5 FEATURES OF MLEARNING TOOLS). For the sake of brevity, the versions and the vendors of the tools are omitted in the chart. *Yes* denotes that the respective feature is supported, *No* – that it is not. It should be also noted that although a tool may have a specific feature capability, e.g. offline storage, if it is not HTML5-supported, it will be marked with *No* in the chart.

HTML5 FEATURES OF MLEARNING TOOLS					
Product	Audio & Video	Drag & Drop	Geolocation	Graphics & Animation	Offline Storage
Luminosity Studio	MP3; FLV, MP4 (H264)	Yes	No	Yes	No
Claro	MP3; MP4 (H264)	No	No	Yes	Yes
Raptivity	No	Yes	No	Yes	Yes
mLearning Studio	MP3; FLV, MP4 (H264)	Yes	No	Yes	No
ReadyGo WCB	OGA; OGV	Yes	No	Yes	No
ToolBook	MP3; MPEG	Yes	Yes	Yes	No
Lectora Inspire	MP3; MP4 (H264)	Yes	No	Yes	No

III. CONCLUSIONS

The main conclusions of the proposed classification are three. Firstly, although for a significant number of mLearning tools (27) is claimed they support HTML5, substantial information is provided only for 7 of them, which makes the level of support of the rest obscure. The second conclusion is a set of observations for the HTML5 features: each of the reviewed tools supports HTML5 *Graphics & Animation* and at least two other features (one supports three other); only one tool doesn't support HTML5 *Audio & Video* and only one *Drag & Drop*; two supports HTML5 *Offline Storage* and one supports HTML5 *Geolocation* feature. Considering these observations and the information provided on the websites of the tools, it can be concluded that they will all support each of the features in at most one year, which clearly confirms the importance of HTML5 in the mLearning.

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