

# Micro Learning and EduPsy LMS

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**Abstract:** *Micro-learning is learning in smaller segments. It includes short lessons in a form of written (textual and/or textual-graphic), podcast (audio) or video materials. In addition to reading, listening and viewing new contents, learning is also conducted through problem solving, Q & A's, quizzes and/or preparation of small projects. The article describes micro-learning (about the micro-learning, why to use it, pros and cons, used techniques, platforms most commonly used for micro-learning and directives for creation of new or adapted distance learning system based on micro-learning methodologies). The article briefly describes the Learning Management System EduPsy created at the University of Pula, as well as implemented micro-learning's methods.*

**Keywords:** Micro-Learning, EduPsy LMS

## 1 Introduction

Development of technology brought essential changes to all segments of our lives, including teaching. Need for a more effective learning by distance learning led to the development of the Learning Management Systems (LMS). Growing number of schools, universities, institutions, organizations, private and public corporations utilize E-learning to offer a larger quantity of services or to better manage time and spare the expenses needed for training of their employees. Micro-learning is one of the examples of E-learning.

This paper will present the Micro-learning: about Micro-learning, reasons for its utilization, benefits and disadvantages of Micro-learning, and finally there will be examples of the use of Micro-learning in the LMS EduPsy with listed techniques for improving Micro-learning and principles for creation of individual Micro-learning using LMS.

## 2 About Micro Learning

Micro-learning is learning divided into smaller parts, smaller units. Micro-learning is an online training

methodology that uses a performance-based educational approach incorporating short (5 minutes at most) content-rich videos with text, pictures and audio. [1]. It is rarely the classic teaching, as these lectures are mostly based on 45-minute or longer time segments.

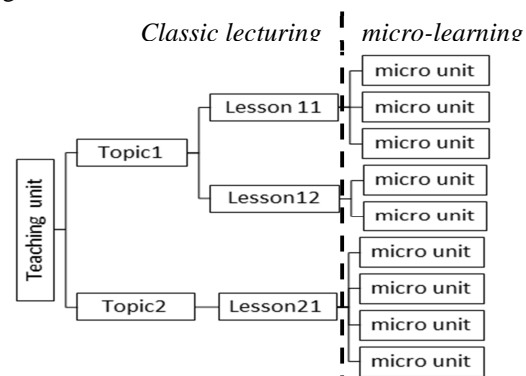


Figure 1. Presentation of teaching materials with classic lecturing and micro-learning

Micro-learning found its full application in E-learning, and in particularly in (mobile) m-learning. Learning includes short lessons in written and text-graphic forms, podcasts (audio forms) or video-clips. In addition to reading, listening and viewing of the new contents, learning is also conducted via problem solving, Q&A's, quizzes or preparation of small projects.

In contrast to the classic teaching, where teaching material is divided only in teaching themes and units, teaching material in the micro-learning is divided into additional micro-units (Figure 1) that can be learned as individual units.

Just like "classic" E-learning, Micro-learning can be accomplished in various forms, for example through online articles, multimedia video and/or audio forms, short presentations, or through discussion groups (forums), e-mails and even chats. Sometime, students can be given tools to achieve final goals.

### 2.1 Why use Micro-learning?

In classic E-teaching a) lessons are usually long and require lots of time for learning; b) the content is

rarely changing; c) technological advance in certain skills (especially in digital competencies) is rapidly progressing and, although necessary, most of the teaching material cannot be qualitatively upgraded; d) upgrade and redesign are relatively expensive and many educational organizations cannot (financially or organizationally) afford them; e) course participants also cannot afford new courses due to the shortage of time and money.

Teaching methods in Micro-learning are more suitable: a) lessons become micro lessons and less time is needed for learning; b) since lessons are shorter, the content can be prepared and changed much faster; c) due to the rapid technological progress, new technological possibilities can be used for preparation of short, micro-teaching materials that could help in understanding of the teaching contents; d) since only individual short, micro-lessons are changed, upgrade and redesign do not have to be expensive, and most educational organizations will be able to afford them (financially and organizationally); e) course participants learn only the upgraded contents (short teaching materials). Furthermore, less time would be needed for adoption of micro-lessons, and participants would need shorter time spans for learning. As a result, participants would not have to enroll in expansive courses, but only in the upgrade, which is a more favorable option.

## 2.2 Advantages and disadvantages of Micro-Learning

Like any other method, the Micro-learning method has numerous advantages and disadvantages.

Some of the advantages of Micro-learning are:

a) It allows students to gather data in small segments, and helps them to adopt the skills and teaching material more effectively; [2]

b) Learning can be done 'on the move'. Mobile learning enables students to learn at any location, and at any time of day or night. The only prerequisite is access to Internet via computer, tablets or smart phones, since micro-courses are accessible via Internet and mobile applications;

c) It encourages quick learning, and helps students to more easily memorize the content [2];

d) At the moment, it is an innovative way of transfer of skills and knowledge. It is necessary to approach the education as a fun and interesting activity for the participants. For example, introduction of quizzes on a weekly basis, using gadgets in teaching, engaging special interests of the participants through many small and short micro-contents, engaging in group discussions etc. These are innovative ways of education that are rarely used in classic education, and only somewhat more often in the E-courses.

e) This type of learning enables students to memorize the lessons. The entire curriculum and program need to be divided into smaller micro

teaching units and presented in a manner that allows participants to learn them separately. Kar states that each micro-unit is composed of teaching units that last no longer than several minutes [2], Mosie [3] recommends duration of several seconds to 15 minutes, and the same duration is recommended in the literature [4], [5], while Kummur recommends duration from 3 to 7 minutes [6]. Each micro-unit incorporates micro-teaching segment that lasts only several minutes. The shorter the micro-unit, the greater the probability that participants will stay focused on the teaching material. Participants know in advance that each micro-teaching segment will take no longer than few minutes, and they can plan and allocate time for learning new contents [7].

f) Some of the platforms used in teaching include social networks, online forums, and Web 2.0 tools, and participants can attend courses that are designed for micro-learning from their own homes.

g) Classes will be even more interesting if they use various multimedia materials like video-clips, presentations, animations etc. [2]. A research indicates that most students prefer learning via e-mails (23.5%), and then through Sound and Voice Recording (14.1%), Video Clips (13.8%) while the smallest number of students prefer learning through Reference Volume (only 4.7%). [14]

h) Micro-courses are either free of charge, or cheaper than other online courses. Users pay only for the knowledge they need or want to adopt. [7]

i) Authors and developers of micro-courses can see which contents are interesting to the participants based on statistics of the participants' requests for new contents, and in line with these data decide which micro-courses to develop.

j) Authors of micro-courses can easily update micro-course in line with the new trends, and respond to the reaction of users. Micro-courses are flexible, as they are simple to develop and edit [7].

There are some disadvantages of micro-courses:

a) Micro-course needs to be developed in a short time due to a rapid change of teaching contents (especially in digital competencies);

b) Micro-lessons need to be designed in a less time-consuming way for the participants;

c) Participants approach micro-learning in a more flexible environment that could decrease learning efficacy in comparison with a more formal setting that prevails in the face-to-face teaching environment [2].

## 2.3 Techniques for improvement of micro-learning

Micro-learning is an innovative method of education that can utilize one or more techniques for the advancement of teaching. Some of the techniques are online games, video-clips and podcasts, multimedia presentations, simulations, blogs and quizzes.

**Online Micro-games** - It is generally accepted that people learn more about a topic if they participate in an event where a theme is discussed or if they participate in a thematic activity. Pedagogy also teaches that children learn the best and most effectively through playing. That fact applies equally to adults as it does to children. Participation in games, even those without winners, would allow participants to communicate directly with the content of a lesson and/or among themselves. By doing so, they would be more exposed to the educational content.

**Podcast based contents** - A podcast is a digital database containing the audio or audio-video recording with educational contents. Audio or audio-video instructions for participants can be relatively easy to record and upload on an Internet service such as YouTube or Vimeo. Thus, this educational content would be available to participants at any time from any place. This Micro-learning technique is especially applicable when participants need to demonstrate skills. Furthermore, participants do not need to spend large blocks of time for learning of the new materials.

**Multimedia presentations** - Online slides, enriched with picture, text, animation and sound are becoming increasingly popular. When information is presented with the audio, visual and interactive methods, the effectiveness of education with multimedia presentation is quite substantial. Slides are showing micro-lessons in a time-span of few minutes, and they enable participants to understand terms or concepts in each frame before they move to the next.

**Simulations** - Simulations that imitate real environments are a highly effective method of education. They enable participants to build specific skills or understand a problem; the simulation gives them an opportunity to practice certain skills in a virtual environment or a real life situation.

**Educational blogs** - Even the simplest and easily understandable blog can serve as a micro-learning activity. Participants can visit the blog whenever they want and collect needed information. Blog posts can be used as a method of notification for the potential participants about the offered lessons, as well as the lessons themselves. Lessons on blogs, enriched with multimedia contents, are an attractive and effective method of education.

**Online assessments and quizzes** - Some of the common techniques of micro-learning are online assessments or quizzes. Virtual exams can give the instructors and participants an opportunity to receive a feedback on the level of acquired skills or understanding of individual participant. Virtual tests are a great source of motivation that always result in an improved level of knowledge or skills in participants.

Micro-learning techniques offer fantastic possibilities for improving skills and understanding of educational material in an online classroom and/or in a work environment, as they allow each participant to learn at his/her own pace and absorb the material fully before they move on to the next. [2].

## 2.4 Platforms used for Micro-learning

Bellow are listed some of the platforms that can be used for micro-learning [8].

**Coursmos** - Coursmos is the world's first learning platform that supports micro learning. It hosts several hundreds of online micro-courses that are broken into smaller, more manageable units. These courses are characterized by minutes-long lessons that can be taken while on the move.

**Twitter** - Twitter is the most popular micro-learning tool that helps create and share information with people, thereby building relationships.

**Yammer** - Yammer is the most popular enterprise micro-learning tool that helps employees collaborate across departments and locations within organizations.

## 2.5 Directions for creating micro-learning materials

Micro-learning is a method of teaching and delivering contents to the participants of E-learning in small quantities. Participants individually control what they learn and when.

Therefore, the course creator needs to define and set only a single teaching goal. When more teaching goals are embedded into the lesson, they will have more content and lessons will be longer, which would not suit the participants and many of them may leave the course.

YouTube has a large number of visitors on daily, weekly and monthly bases. Therefore it is necessary to upload as many micro-lessons on YouTube as possible.

Recommendations for video recording are to do it in daylight, or in well-lit premises with a tripod and with basic knowledge of framing.

To achieve the audio quality, recording should be done in a quiet place, or have a good quality microphone (on a stick, holder, or hand-held). Length of the video-clip should be no longer than several (for example 4) minutes. Due to the limited recording time, it is necessary to come up with a well-thought concept, and eliminate the extra content. Participants do not like long and boring introductions, and prefer to go straight to the teaching goal. Additional post-production of the video-clip will improve its quality.

When the teaching content is created, it is necessary to get an informative feedback. In order to achieve this goal, after participants go through micro-lessons, they should take a test. The test should contain many questions that would be the basis for the assessment of the level of the adopted teaching contents. If they had to adopt a skill, they could be asked to create, for example, a 30-seconds long video-clip about their progress. That would be a proof of their learning success [2]. It is not recommended to have only one or two questions, because they would not be the right indicator of the teaching success.

Still valid directions for the design of the Micro-learning activities suggested by Theo Hugi in [6] are:

**Time:** relatively short effort, operating expense, degree of time consumption, measurable time, etc.

**Content:** small or very small units, narrow topics, rather simple issues, etc.

**Curriculum:** small part of curricular setting, parts of modules, elements of informal learning, etc.

**Form:** fragments, facets, episodes, "knowledge nuggets", skill elements, etc.

**Process:** separate, concomitant or actual, situated or integrated activities, iterative method, attention management, awareness (getting into or being in a process), etc.

**Mediality:** printed media, electronic media, mono-media vs. multi-media, (inter-)mediated forms, etc.

**Learning type:** repetitive, reflective, pragmatist, conceptualist, constructivist, connectivist, activist, and behaviorist; also: action learning, classroom learning, corporate learning, etc.

### 3 EduPsy LMS and Micro-Learning

#### 3.1 About EduPsy LMS

EduPsy Learning Management System (LMS) was created for research of the effectiveness of E-learning and E-teaching at the Juraj Dobrila, University of Pula, Department of Educational Science. EduPsy LMS is modular, and its development follows variables that need to be researched and tested.



Figure 2. Home page of EduPsy LMS

Architecture of created system is shown in Figure 3; however this work will not elaborate on them.

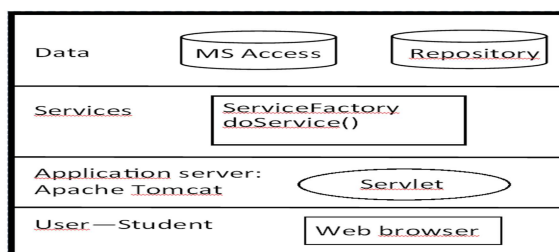


Figure 3 Architecture of the EduPsy and a part of used technologies

EduPsy LMS is mainly based on services. The core of each service can be viewed in the

generalization of the objects of the service, i.e. in the abstract presentation of the object of the service:

```
public interface Service {
    public abstract String
        doService(HttpServletRequest
            httpServletRequest);
    public abstract boolean
        requiresAuthentication();}

```

Each service must implement the mentioned abstract methods

*doService* and *requiresAuthentication*.

First method tells what the specific service will do, and the second method replies to the question whether the specific service needs to have an authorization, or who can use the mentioned service: the user and/or other service.

EduPsy is in general built from nine main services:

**1 IQ Service** – service that determines which test (IQ or ILM) will be presented to the user - student.

**2 User Authentication Service** – Service used in:

a) User authentication;  
b) Authorizing the user, i.e. allocating authorization over the contents;

c) Setting user's values in the session;

d) Redirecting to the home page.

**3 UpdateLesson Service** – service used to update existing contents: NastavnaCjelina, NastavnaJedinica, NastavnaČestica and Odlomaka.

**4 StudentLesson Service** – service used for:

a) Generating available menus to the user: Student;

b) Adapting contents for display to the user: Student;

c) Managing the course of learning for the user: Stu.

**5 QuestionView Service** – used to display posed questions to the user: Student.

**6 QuestionaryView Service** – used to manage questions posed to the user: Student.

**7 QuestionaryLesson Service** – used to display questions posed with the whole unit to the user: Student

**8 NewLesson Service** – used to:

a) Create menus for the users Student and Teacher;

b) Create new contents for the user Teacher;

c) To display contents in the 'edit' mode to the user Teacher.

**9 Logout Service** – used to log out from EduPsy and end the session for the users Student and Teacher.

#### 3.2 Determining the dominant factor of intelligence and learning style of the user in EduPsy LMS

EduPsy is an adaptive LMS that presents teaching material based on the dominant factor of intelligence of the participants and their learning styles. Initial data on intelligence and learning styles of the participants are received via completion of two

questionnaires: a standardized IQ test, and a questionnaire on the learning style.

Gardner's Theory of the multiple intelligence was used [9] as the theoretical basis for the IQ test. It contains of eight components of intelligence. For the purpose of EduPsy LMS, three components of intelligence were measured: Mathematical-logical, Verbal-linguistic and Visual-spatial. If a participant refuses to take the IQ test, the system uses default settings for intelligence for that particular individual. The same procedure is used for the learning styles.

Felder-Silverman's [10] theory of learning styles was used as the theoretical basis for the user's learning style. It was also used Felder-Silverman's model of the learning style that consists of four dimensions: active-reflective, visual-verbal, sensing-intuitive and sequential-global.

For determining the user's learning style based on the four dimensions learning styles (Felder-Silverman's model), we used the questionnaire called *The Index of Learning Styles – ILS* (available at [11]), by the authors Richard M. Felder and Barbara A. Solomon. The questionnaire contains 44 questions, 11 questions per each dimension. Results of each dimension were divided in three parts and user in active-reflective dimension was determined 'active' (if 7 or more answers were „active“), 'neutral' or 'reflective' (if 7 or more answers were „reflective“). So, for the learning styles, each user had four values, one each for every dimension of the learning style.

### 3.3 Preparation and presentation of teaching material in EduPsy LMS

When entering the teaching materials in EduPsy LMS, textual part, questions for testing knowledge and links to other teaching materials are stored in the MS Access database located on a computer server.

Each text section, every question and every link are stored in separate boxes. Photos, animations, audio and video materials are stored on a server in separate folders or external Internet services are used.

When presenting teaching materials to the users, EduPsy LMS, based on the information about the user (how many lessons the user took, which tests s/he passed etc), determines which teaching materials to present to the user. The teaching material is formed by several CSS (Cascading Style Sheets) files. At the beginning, basic CSS files are applied on the visual aspect of the teaching materials, based on the most prominent factor of the user's intelligence. Then, four files are applied, defined for the preferred learning style, first for the active-reflective dimension, second for the verbal-visual, third for the sensing-intuitive and last for the sequential-global dimension. If the value for a dimension is 'neutral', then CSS does not apply for that dimension. Since with CSS, the character of Value of the Properties is inherited, then Value of certain Properties for a specific Sector is

maintained if for the same Selector/Property there is no new Value.



Figure 4 The appearance of the screen after applying CSS files for users

With a gradual participation in the course, the system independently collects information on the learning style of all individual users and automatically adapts to each user.

In EduPsy LMS colors are used for the contents and the background text, based on the earlier conducted experiment [12]. User can select preferred combination of colors at any time.

### 3.4 Implemented techniques of micro-learning in EduPsy LMS

The most important technique of micro-learning that is used in EduPsy is division of contents in small segments. In the EduPsy LMS of the teaching micro-unit, text section of each chapter contains at the most up to a half page of a teaching material (up to 900 characters, including spaces) and keywords.

In cases where the teacher enters more characters in the standard editor (Figure 5), prior to the upload, the system sends an alert to shorten the lesson.

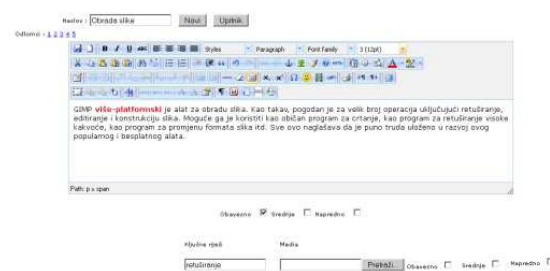


Figure 5. The appearance of the text input window, keywords and files in EduPsy LMS

By doing so, created teaching micro-unit will be easily read and adopted. Habitually, each micro-lesson is followed by test-questions that allow a participant to test his/her level of adopted knowledge or skills. In some cases (when the user fails the test), based on the learning style of the participant, EduPsy LMS requests the participant to go over the micro-lessons once more.

EduPsy LMS supports the upload of photos, audio and video clips, animations, multimedial presentations - on its own server - as well as links to materials on other Internet services, like YouTube, Vimeo and others. In all these cases, EduPsy LMS does not check the length of (audio and/or video) recording or the size of the uploaded files; this is the responsibility of the teacher who creates the teaching material.

All the techniques of the micro-learning, such as online games, video-clips and podcasts, multimedia presentations, simulations, blogs and quizzes, are used. They connect with the EduPsy LMS via links. Online games are used on some of the known platforms (for example, Zonde), for creation of educational games. Blogs are used, primarily as platforms for publishing and commenting of the student's essays. Hot Potatoes platform is usually used for creation of the quizzes. A substantial percentage of the video and audio clips and multimedia presentations are created by students, as a part of their practical work. These files are directly stored in the EduPsy, while some are stored on the Internet services like Vimeo and YouTube. For the moment, we use simulations only via links to the external contents.

## 4 Conclusion

Micro-learning is learning of smaller teaching contents, micro-contents, for which learning lasts only several minutes. It has numerous benefits as the time and place of learning is mostly not formally defined, and the participants can access teaching material at their convenience from any place with the Internet access. Traditional teaching models are often not sufficient for continuous skills' update and upgrade as they are cumbersome, and confine learners to prescribed and closed systems. [13] Micro-learning is a step-by-step learning, and steps could be so small that every participant can master them.

Techniques used vary, and among the most successful are the video-clips. Application of the micro-learning methods in the LMS systems will make e-learning more effective, faster and cheaper.

## References

- [1] Vodeclik: *Micro learning: when less is more: How the bite-sized format can revolutionize your training practices and support your enterprise's digital transformation*, Vodeclik, New York, 2015
- [2] Kar, S. *Microlearning Pros and Cons* [elearningindustry.com/microlearning-pros-and-cons](http://elearningindustry.com/microlearning-pros-and-cons) downloaded: May 10<sup>th</sup> 2015.
- [3] Masie, E. *Nano-Learning: Miniaturization of Design*, Chief Learning Officer 5(1):17, 2006.
- [4] Lindner, M: *Use These tools, Your Mind Will Follow. Learning in Immersive Micro media and Micro knowledge Environments*, Research Proceedings of 13<sup>th</sup> International Conference ALT-C, Heriot-Watt University, Edinburgh, Scotland, 2006.
- [5] Hug, T. *Mikrolernen - konzeptionelle Überlegungen und Anwendungsbeispiele*. In *Jahrbuch Medienpädagogik 8: Medienkompetenz und Web 2.0*, pages 221-238, Wiesbaden: VS Verlag, 2010.
- [6] Kumar, S. *17 Awesome Resources on Micro Learning*, <https://www.linkedin.com/pulse/20141001110340-41499233-17-awesome-resources-on-micro-learning> downloaded: May 10<sup>th</sup> 2015.
- [7] Dmitriev, P. *What is micro-learning?* [coursmos.squarespace.com/blog/2013/8/31/what-are-micro-courses](http://coursmos.squarespace.com/blog/2013/8/31/what-are-micro-courses), downloaded: May 10<sup>th</sup> 2015.
- [8] Hug, T. (2005) *Micro Learning and Narration. Exploring possibilities of utilization of narrations and storytelling for the designing of "micro units" and didactical micro-learning arrangements*. 4<sup>th</sup> International Conference: Media in Transition, May 6–8, 2005, MIT, Cambridge, USA.
- [9] Gardner, H; Kornhaber, M. L; Wake, W.K. *Inteligencija: različita gledišta*, Naklada Slap, Jastrebarsko, 1999.
- [10] Felder, R. M; Silverman, L. K. *Learning and Teaching Styles in Engineering Education*, *Engr. Education*, 78(7), pages: 674-681, 1988
- [11] Felder, R. M; Soloman, B. A. *The Index of Learning Styles - The questionnaire* -[www.wiley.com/college/msci/callister320137/ils](http://www.wiley.com/college/msci/callister320137/ils) downloaded: May 10<sup>th</sup> 2015.
- [12] Žufić, J; Kalpić, D. *More efficient e-learning through design: color of text and background*, *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, pages 3314-3319, Chesapeake, USA, 2009.
- [13] Fielder, S; Kieslinder, B. *Adapting to changing landscapes of education*, *Proceedings of Micro learning 2006*, Centre for Social Innovation, Innsbruck, Austria, 2006.
- [14] Job, M. A; Ogalo, H. S. *Micro Learning As Innovative Process of Knowledge Strategy*, *International journal of scientific technology research*, 1(11):92-96, 2012