

# Approaches for integration of educational computer games in e-learning environments

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# Agenda

- **INTRODUCTION**
- **FRAMEWORK DESCRIPTION**
- **COMPARATIVE STUDY**
- **EXAMPLE IMPLEMENTATIONS**
- **CONCLUSION**




# INTRODUCTION

- **Serious games** – a “mental contest, played with computer in accordance with specific rules that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives”.
  - **Gamification** in education means the use of gaming elements in the learning process, that affect students' emotions, feelings, thoughts, and behaviors in order to achieve the set learning objectives.
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# INTRODUCTION

- Some of the most common and popular elements in gamification and educational computer games are:
    - earning badges;
    - points and awards;
    - passing through levels and telling a story;
    - leaderboards and ranking;
    - feedback;
    - challenges;
    - competition, and so on.
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# INTRODUCTION

- Aims of the study
    - to outline framework for analyzing of possibilities for game and gamification integration in e-learning environments;
    - to discuss a comparative study of features of popular free open source e-learning environments like Moodle, ILIAS and aTutor.
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# FRAMEWORK DESCRIPTION (1)

- Generally, we accept that all contemporary e-learning environments (Learning Management Systems, LMS) support responsive interface and/or have mobile apps that can be used instead of the responsive interface in case of mobile device usage.
  - According to this, we exclude support for different end-user devices from our framework.
  - The proposed framework for comparing capabilities for integration of educational computer games and gamification in e-learning environments divides them in three main categories.
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## FRAMEWORK DESCRIPTION (2)

- **System integrated** - delivered with basic distribution of the LMSs.
- **System specific** – capabilities to add gamification functionalities and educational games as extensions (modules, plugins) developed in a specific for the particular LMS way, that cannot be used in another LMS.
- **Standard-based** – extensions developed according to specifications/standards like
  - **SCORM** (Sharable Content Object Reference Model)
  - **LTI** (Learning Tools Interoperability)
  - **xAPI** (Experience API, formerly Tin Can API)


# COMPARATIVE STUDY – SYSTEM INTEGRATED CAPABILITIES

LMS	Capabilities
<b>Moodle 3.4</b>	<b>Site Badges</b> – site level, manually by tutor or automatically by the system. <b>Course Badges</b> - course level, manually by tutor or automatically by the system.
<b>ILIAS 5.3</b>	<b>Activity Badges</b> – site level, automatically by the system if learners fill appropriately their profile. <b>Course LP Badges</b> – course level, automatically by the system, if learners meet some criteria <b>Verdienst-Badges</b> – manually by tutors
<b>aTutor 2.2</b>	No gamification capabilities as core functionality





# COMPARATIVE STUDY – SYSTEM'S SPECIFIC EXTENSIONS (1)

- All considered LMS have a (wide) set of developed system specific extensions named plugins.
  - Plugins' development processes are well documented.
  - Developed plugins could be included into official plugins repositories after process of certification.
  - We include only plugins from the official LMSs' repositories.
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# COMPARATIVE STUDY – SYSTEM'S SPECIFIC EXTENSIONS (2)

LMS	Extencions
<b>Moodle 3.4</b>	<p><b>Level Up!</b> - allows students to earn points for their actions, to track their progress, and use leaderboard.</p> <p><b>Ranking</b> - adds points when learners pass monitored activities with completion criteria set by the teacher with daily, weekly and monthly rankings for learners' achievements.</p> <p><b>Stash</b> - adds a block that shows students items that they have picked up through the course.</p> <p><b>Quizventure</b> – allows gamification of the quizzes.</p> <p><b>Mootivated</b> and <b>Motrain</b> are mobile apps that encourage student/employee effort for learning in Moodle.</p>
	<p><b>Game</b> - allows use of questions, quizzes and glossaries to create a variety of interactive games.</p> <p><b>Treasure Hunt</b> - allows outdoor, indoor and virtual-map treasure-chases with geolocation and QR codes.</p>

# COMPARATIVE STUDY – SYSTEM'S SPECIFIC EXTENSIONS (3)


LMS	Extencions
<b>ILIAS 5.3</b>	<b>Match &amp; Memo Pool</b> and <b>Match &amp; Memo</b> - implement together memory cards game.
<b>aTutor 2.2</b>	<b>GameMe</b> - provides set of gamification functionalities. Points are earned by the students when an event occurs. According to learners' progress, Event Messages are available to inform them about some particular achievement

# COMPARATIVE STUDY – STANDARD-BASED EXTENSIONS

LMS	SCORM	LTI	xAPI
<b>Moodle 3.4</b>	SCORM 1.2 player	LTI 2 as consumer and/or provider	through xAPI Launch Link plugin
<b>ILIAS 5.3</b>	SCORM 1.2/2004 as player and creator	LTI 1.1 as consumer and/or provider	Is planed to support
<b>aTutor 2.2</b>	SCORM 1.2 player	LTI 1.0 as consumer	No support

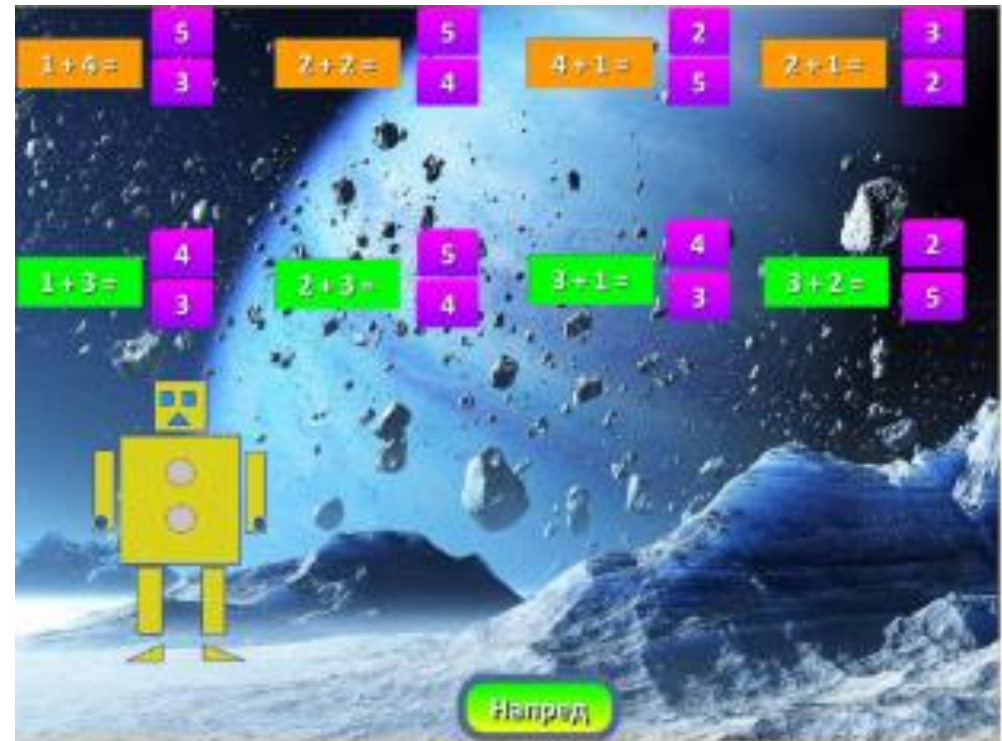


# EXAMPLE IMPLEMENTATIONS

- We decide to implemented games as SCORM 1.2 packages to be compatible with most popular LMS.
  - We choose the following tools
    - free – e-Adventure
    - free web-based LearningApps.org
    - commercial – Adobe Captivate.
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# Game "Robit"

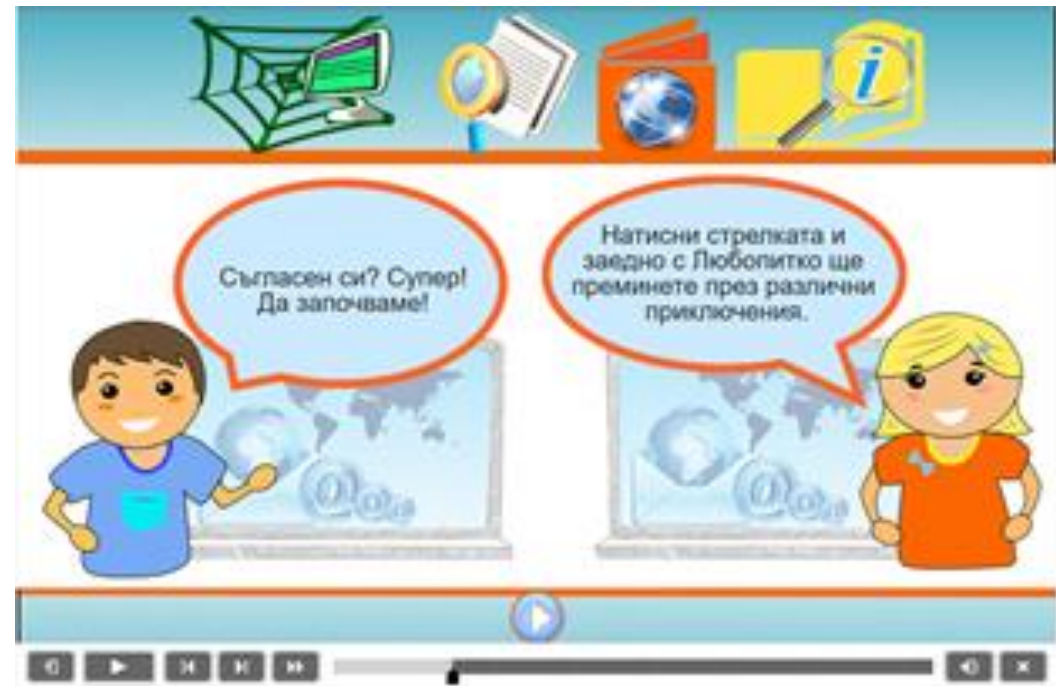
- The game "Robit" is developed following special didactical scenario, designed for primary school pupils.
- The game is intended to help pupils in elementary math operations.
- eAdventure was used for implementation and finally, the game was exported as SCORM package.





# Game "Safe Internet"

- The game involve pupils from lower secondary school to discover how to safely use Internet services like e-mail, social networks, message boards, etc.
- Scenario is case-based and Adobe Captivate was used to implement the scenario.



## Demo game

# "Hangman – European Capitals"

- Developed using on-line web-based tool LearningApps.org.
- The game can be used as web link from the development site or exported as SCORM package.






## CONCLUSION (1)

- Not all of the considered LMS support badges to gamify e-learning content.
- More complex gamification elements like points, levels, leaderboard/ranking are supported as system specific extensions – plugins.
- Some simple educational computer games – crosswords, Sudoku, memory cards, treasure hunt etc. are provided as plugins too.



## CONCLUSION (2)

- SCORM and LTI specifications allow creation of more complex educational computer games.
  - Gamified resources can be developed and used as external services through LTI.
  - xAPI extends functionalities by extending learner's tracking in more detailed level on wide variety of end-user devices.
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**Thank You for your attention!**



**Questions, Comments?**

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