

LEARN4FUN

Gamification theory used in the learning process

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1. Project Specification

This project is aimed at stimulating the participation of students to the educational process and at proposing solutions for an increased awareness on their part. The aims of the project are approached by applying principles from the gamification theory in the recurring teaching activities and by proposing simple and efficient management instruments to the teaching staff and the students as well.

Regardless of the game type, be it a shooter, sports, roleplaying, etc. some features always stand out: a challenging competitive environment and a compelling reward system. The online platform that we envision plans to use these features in order to stimulate various audiences, through the appeal of games, to use their energy into a more productive way, that is, a learning environment.

2. Audience

- Q: Who is going to use the application?
A: Both students (at university level) and professors will be using the application for educational purposes.
- Q: What technologies do users need to be familiar with?
A: The regular Personal Computer (PC) user will be able to use the platform with ease, no additional requirements needed.
- Q: What would users be able to do with the application and why would they use it?
A: Users of the application would be able to reinforce the things that they learn during classes as well as discover many other interesting facts that they did not know beforehand, everything in a more pleasant and interactive environment.
- Q: Where and how can users use the application?
A: Wherever a PC/laptop with internet connection is available.
- Q: I do not like this product! Do I have any alternatives?
A: No other platform would provide the exact services as this one, but for viable alternatives, Coursera and Moodle can be used.
- Q: Sounds complicated! Is any other tool needed in order to use the application?
A: No! The regular (updated) Google Chrome, Mozilla Firefox or Microsoft Edge is enough.

3. Task analysis

Task #1: Creating quizzes;

Type of users: Mainly teachers, limited student ability;

Activity: Creating quizzes on various topics, creating combined quizzes, creating quizzes on tutorials;

Goal: The main purpose is to create a competitive environment from which students can learn as much as possible.

Description: Quizzes can be created by both teachers and students, with some specifications. Competitive quizzes (will contribute to the leaderboard, can be used in tournaments, etc.) can only be created by teachers. If a student wishes to create such a quiz, he will need the approval of a teacher (the teacher will still have to post it). On the other hand, students will be able to create quizzes on tutorials that they post, but these will only contribute to achievements (e.g. Solve 1/5/10 tutorial quizzes) or lesser rewards.

Steps:

- 1) Visit the "Create quiz" page;
- 2) Give it a title a brief description and add related tags;
- 3) Select Add Questions;
- 4) Select the type of question you wish to add: Multiple/single choice, fill-in the blanks or free-answer questions;
- 5) The previous step can be repeated as many times as needed;
- 6) Review the quiz and submit it.

Task #2: Solving quizzes;

Type of user: Students;

Activity: Solving quizzes that can have multiple questions and various rewards;

Goal: The main goal is to learn from the quizzes and to collect points and achievements;

Description: The website will contain quizzes with interesting and tricky questions for the students to solve. After each answer, the student receives a feedback. At the end of the quiz, a score is computed and added to the user's profile. Also, users receive achievements in case of completing different milestones in these quizzes (for example top score in Java quiz, 10/50/100 completed quizzes).

Steps:

- 1) Select a quiz from the dedicated quizzes page;
- 2) Answer the questions from the quiz;
- 3) Submit the quiz and receive your score and rewards.

Task #3: Posting fun facts;

Type of users: Both students and teachers;

Activity: Creating and posting fun facts;

Goal: The main goal is to share interesting facts, on the website, with other users;

Description: Both teachers and students can post fun facts. A fun fact can contain text, images, videos and links. On the website, a page is dedicated for these types of posts, where both students and teachers can share, view and react to fun facts with comments and other reinforcement tools (e.g. smiley faces, likes, thumbs-up, etc.).

Steps:

- 1) Click on the "Fun fact page";
- 2) Click the "Post a fun fact button";
- 3) Insert title in a text field input;
- 4) Insert a short description in a similar field;
- 5) Insert the content in another text area;
- 6) Add external links and tags;
- 7) Add images/videos by using either the dropdown feature or the "Browse" button;
- 8) User is able to either go back ("Back" button), preview his created fun fact ("Preview" button) or post the fun fact ("Post" button).

Task #4: Fun fact of the day;

Type of users: Students, teachers, guests;

Activity: The ability to view the fun fact of the day;

Goal: To randomly select a fun fact and display it on the main page;

Description: From the pool of created (and approved) fun facts, one will be chosen randomly, each day, and it will be displayed on the main page. The section will contain a video, image, some text or a combination of these, the ability to click it and be redirected to the fun fact archive where users will be able to access extra information on the fun fact.

Steps:

- 1) Visit the main page;
- 2) Wait for the fun-fact of the day to appear;
- 3) Read the fun fact and click on it for more information.

Task #5: Reviewing fun facts;

Type of users: Students, teachers;

Activity: Creating a review on fun facts;

Goal: The main purpose of this activity is to offer reinforcement (whether positive or negative) and feedback on fun facts, that other users can see;

Description: All users can review fun facts. A review can consist of either or multiple of the following: reinforcement through a like/dislike, a comment or the ability to share it on different other media. Getting positive or negative reviews will influence the user's standings on the leaderboards and will be reflected on his account.

Steps:

- 1) Select a fun fact either from their specific page or from the "Fun fact of the day" section;
- 2) Choose to leave a like/dislike or a comment.

Task #6: Posting tutorials;

Type of users: Students, teachers;

Activity: Creating and posting various tutorials;

Goal: The main purpose of this activity is to share various how-to-s in order to have a centralized information hub;

Description: Both teachers and students can post tutorials. These tutorials can either be in written format or video format. These tutorials don't have to be created by the person who posts them, but they can be. Tutorials will be posted in a special, separate section of the website. The tutorials may also come in an e-book format.

Steps:

- 1) Visit the "Add a tutorial";
- 2) Add a title and a brief description;
- 3) Add the content of the tutorial which can be a combination of: text, images, videos, hyperlinks or an e-book;
- 4) Submit the tutorial.

Task #7: Viewing and reviewing tutorials;

Type of users: Students, teachers (view and review) + guests (view only);

Activity: Viewing, reviewing and answering to available reinforcement quizzes;

Goal: This activity entails the ability of viewing tutorials, participating in various reinforcement-learning activities and offering feedback on them.

Description: Any user is able to view the available tutorials. This is mainly targeted at the students, but teachers can benefit from this ability as well. A review can consist of either or multiple of the following: reinforcement through a like/dislike, a comment or the ability to share it on different other media. Quizzes may also be related to tutorials, thus helping the users assimilate the information in an easier way.

Steps:

- 1) Visit the tutorials page;
- 2) Select a tutorial;
- 3) Enjoy what the tutorial has to offer;
- 4) Leave feedback in the form of either a comment or clicking a like/dislike button;
- 5) Optional step: solve a reinforcement quiz related to the tutorial.

Task #8: Accessing the global leaderboard/ranking;

Type of users: Students, teachers, guests;

Activity: Viewing the total score for any of the users as well as the rewards accumulated over time;

Goal: This activity allows users to see both their overall ranking and that of other users, ranked by total score and various rewards;

Description: Anyone is able to access the ranking. This is an important part of the application because it stimulates the users to complete as many quizzes as possible and gather badges in order to be at the top of the leaderboard. It also offers an overview of all the students and professors, thus one can find the most suitable person for when he requires help.

Steps:

- 1) Visit the leaderboard page;
- 2) Scroll through the page;

Task #9: Access to personal profile and viewing statistics;

Type of users: Students, teachers, guests;

Activity: Viewing, in a more detailed manner, a user's rankings, strengths and other user-related data;

Goal: This activity allows users to see the overall ranking of the targeted profile as well as additional information, such as: personal preferences, interests, all the completed achievements and level of expertise in different technologies/fields;

Description: All profiles are public, thus anyone can see them. A user can only fill in personal data about himself. All the other statistics (scores for different columns etc.) are automatically computed based on the user's activity and results on the platform. This functionality can be very helpful for choosing partners for team projects, finding the right professor for a license thesis or other personal projects.

Steps:

- 1) Access either the leaderboard page or the personal profile;
- 2) See all the statistics related to the user (global score, number of positive/negative reviews on various website features).

Task #10: Contact-the-developer;

Type of users: Students, teachers;

Activity: Submitting feedback and/or requests to the development team;

Goal: Keeping the development team in contact with the users, in order to fix bugs and improve the overall experience;

Description: Both students and teachers can submit feedback about their experience with the platform, report bugs or make suggestions about features they would like to be added. Once submitted, the information is stored in a database and is only accessible to the development team.

Steps:

- 1) Go to the "Provide feedback" page;
- 2) Complete the form and submit it;

Task #11: Posting a question on the QA page;

Type of users: Students, teachers;

Activity: When one has a question related to computer science and needs help with finding the answer, he or she may ask the community;

Goal: Helping students with their projects and trying to overcome any hurdles that may arise in the learning process;

Description: A student in need of help can post a question and add several tags so that others can find it easier. If someone encounters a problem with a project, chances are somebody else will have or has already solved it. This way it would be easier to find a right or better answer for the same question, even better: a TA or professor would be able to provide a correct solution.

Steps:

- 1) Visit the QA page;
- 2) Provide a title and a description to the problem;
- 3) Select the appropriate question-related tags;
- 4) Submit the question.

Task #12: Answering a question from the QA page;

Type of users: Students, teachers;

Activity: Help others solve errors/bugs or even find a right solution for a problem;

Goal: Increase the cooperation between users and at the same time share valuable knowledge;

Description: Any logged user can answer a question on the QA page. However, the comment may be deemed valuable or not by the rest of the community by using “helpful” or “not helpful” buttons. This contributes to a user’s total score and depending on the tags, it increases or decreases the score for particular skills.

Steps:

- 1) Visit the QA page;
- 2) Select a question that is to be answered;
- 3) Provide an answer/solution;
- 4) Submit the answer/solution;
- 5) Answers can be rated as either being helpful or not helpful.

4. User scenarios

Scenario #1: Creating quizzes:

Steps:

- 1) Visit the "Create quiz" page;
- 2) Give it the "Java Master" name;
- 3) Give it a brief description: This is a tutorial for those who wish to test their knowledge about the more advanced parts of Java;
- 4) Add related tags: OOP, Java, master, design-patterns;
- 5) Select question type: free-answer question;
- 6) Type your question: "Describe the Observer design pattern";
- 7) Select question type: multiple-choice;
- 8) Type your question: "Java is a(an)";
- 9) Type the options ("Scripting Language", "OOP Language", "Procedural Language") and select the correct answer ("OOP Language");
- 10) Steps 5-6 can be repeated as many times as needed by pressing the "Add another question" button;
- 11) Review the quiz and submit it by pressing the "Done" button;
- 12) In case the quiz has no name or doesn't have at least 1 question the user won't be able to create the quiz and he will be prompted to fill the required fields.

Motivation: The main motivation for the chosen user interface design is that it is easy to understand, reflected through the fact that the user can choose from a certain amount of options and is guided through various steps, until the process of creating a quiz is done. Also, this design resembles the one used on moodle websites.

Scenario #2: Solving quizzes;

Steps:

- 1) From any page, click on the Quizzes tab;
- 2) Select the Java Master quiz;
- 3) Answer the questions from the quiz by fulfilling their various requirements;
- 4) Click on the Submit button and you will be redirected to the Results page for that quiz;
- 5) After viewing your statistics, you can Check the Global Rankings, view your Profile or go back to solve another quiz;
- 6) In case the user quits the quiz before submitting it, the progress will not be saved, and in case of a tournament it will result in disqualification.

Motivation: The main motivation for the chosen user interface design is that the user is guided throughout the process of solving a quiz through steps with intuitive explications. Furthermore, this design is applied also on moodle websites.

Scenario #3: Posting the fun fact;

Steps:

- 1) From any page, visit the “Fun-facts” page;
- 2) From the “Fun-facts” page you can click on any fun-fact, then click on the “Post a fun-fact” button OR click the “Post a fun-fact” button directly from the fun-fact page;
- 3) Add a title: “Did you know? – Firefox”;
- 4) Add a brief description: “This fun fact explains the origin of the browser’s name and logo”;
- 5) Add the content of the fun fact: “The English word for red panda is “Firefox” which is where the browser gets its name from – this means the Firefox logo is actually a red panda, not a fox!”;
- 6) Add related images: “Firefox logo in comparison with a red panda”;
- 7) Add links: <https://www.thefactsite.com/2013/02/top-100-technology-facts.html>;
- 8) Add related tags: “browser”, “Firefox”, “did-you-know”;
- 9) Submit the fun fact by pressing the “Post” button;
- 10) In case the user doesn’t enter a title or content, he will not be able to submit the fun fact and will be prompted to fill those fields.

Motivation: The motivation for the chosen interface design is that the user is guided throughout the process through intuitive steps. Furthermore, it is also used on Facebook when posting activities, making it easy to be understood by teachers or students.

Scenario #4: Fun fact of the day;

Steps:

- 1) Visit the home page by either typing the URL in the browser or clicking the “Home” button from any page on the website;
- 2) Click on the bullets to find the “Fun fact of the day” (e.g. “Did you know? – Firefox”) or wait for it to auto-scroll into view;
- 3) View what the fun fact has to offer (Firefox logo – red panda comparison image, shortened content) and/or click on it for more details;
- 4) Clicking on the fun-fact will redirect the user to that specific fun-fact’s page.

Motivation: The main motivation for the chosen design is that it is similar to viewing high rated posts on Facebook, which makes it more familiar for students, teachers or guests.

Scenario #5: Reviewing fun facts;

Steps:

- 1) Click on the "Fun fact page";
- 2) Click on the "Did you know? – Firefox" fun fact;
- 3) Click on either the "Like", "Dislike" or "Share" button;
- 4) Fun facts can also be "Liked", "Disliked" or "Shared" from the main fun-fact page or the "Fun fact of the day" section;
- 5) Insert a comment in the "Comment" field: "I really find this fun fact interesting, good job for sharing it!";
- 6) Either press "Enter" to submit a comment or click the "Submit" button;
- 7) In case the comment is blank, the user won't be able to submit it.

Motivation: The main motivation for the chosen design is that it is similar with the one of reviewing posts on Facebook.

Scenario #6: Posting tutorials;

Steps:

- 1) Click the "Tutorials" button that will redirect you to the Tutorials page;
- 2) Write a title for the tutorial you are going to submit: "Angular 7";
- 3) Write a short description related to the tutorial you are going to add: " Angular 7 is here and it's not spooky at all! This post highlights the latest features and improvements in Angular 7";
- 4) Write a long description related to the topic of the tutorial you want to add: "Angular is a TypeScript-based open-source front-end web application platform led by the Angular Team at Google and by a community of individuals and corporations. Angular is a complete rewrite from the same team that built AngularJS.";
- 5) If you know a link related to this tutorial you can add it in the Video section: "<https://www.youtube.com/watch?v=5wtmKulcquA>";
- 6) Choose a tag that fits best to your question: "angular";
- 7) Submit the tutorial by pressing the "DONE" button.

Motivation: The motivation for the chosen design is the fact that it resembles the design of creating a post on Facebook, making it more familiar to the users. Furthermore, the user is guided through intuitive steps throughout the process.

Scenario #7: Viewing and reviewing tutorials;

Steps:

- 1) Click the "Tutorials" button that will redirect you to the Tutorials page;
- 2) See a list of tutorials you can watch or read;
- 3) Select a tutorial for example "Angular 7";
- 4) Enjoy what the tutorial has to offer and learn the most from it;
- 5) Leave feedback in the form: "What an amazing tutorial. It helped me a lot with my work";
- 6) Click the like or dislike button depending on your opinion about how useful was the tutorial you just watched;
- 7) Moreover, you can solve a reinforcement quiz related to the tutorial. E.g.: questions related to differences between different versions on angular or how it is different from other JS frameworks.

Motivation: The motivation for the chosen design is the fact that it resembles the design of reviewing posts on Facebook, making it more familiar to the users.

Scenario #8: Accessing the global leaderboard/ranking;

Steps:

- 1) From either the "Home" page or any other website page, click on the "Rankings" button on the navigation bar;
- 2) On the top of the page you will see your standings (e.g. User: Mihai, Total Score: 125, Rewards: "Completed 10 quizzes", "Posted 7 Fun-Facts", "Achieved "Master" in Java", Position: 17);
- 3) On the rest of the page you will see a list containing the leaderboard (e.g. Position: 1: User: Andrei, Score: 250, Position 2: User Andreea, Score 225, etc.);
- 4) Click on any user to view his statistics and achievements (badges).

Motivation: The motivation for the chosen design is the fact that this kind of design is seen throughout multiple websites in the case of showing a leaderboard, being simple through representing the rank of each user through a list.

Scenario #9: Access to personal profile and viewing statistics;

Steps:

- 1) Click on either the "Rankings" button, or the "My Account" button;
- 2) If on the "Rankings" page, click on the "View My Profile" button;
- 3) See your name: "John Doe", university: "College Cork", your role: "computer science student", age (optional): 21, score: 15872 and standing: 8 on the top of the page;
- 4) View a graph on the acquired skills: Technologies, Concepts, Mathematics, Algorithms, Hardware, Software, etc.;
- 5) View personal badges: "Math-Master", "Hardware Hero", "VHDL Geek", etc.;

Motivation: The motivation for this design is the fact that it can be seen throughout multiple websites (e.g Github), making it more familiar for students, teachers or guests.

Scenario #10: Contact-the-developer;**Steps:**

- 1) Click on the "Provide feedback" button in order to visit the respective page;
- 2) Read the "How important is your opinion to us" text;
- 3) Write the suggestion: "I believe you should add more badges and achievements for users so that we would feel more engaged in the activities on the website";
- 4) Press the "Submit" button to provide your feedback;
- 5) In case the suggestion field is empty, the user will be prompted to fill it, but the submit will not take place; The user is required to enter a minimum of 75 and a maximum number of 500 characters for the feedback to be considered valid.

Motivation: The design is chosen because it is the most common thing seen on websites, being a simple form, easy to understand, through which one can take contact with the developers or owners.

Scenario #11: Posting a question on the QA page;**Steps:**

- 1) Click the "QA" button that will redirect you to the QA page;
- 2) Write a title: "JS Frameworks";
- 3) Write a short description related to the title you entered above: "Which JS frameworks are you aware of?";
- 4) Write a long description related to the topic of the quiz you want to post: "A JavaScript framework is an application framework written in JavaScript. It differs from a JavaScript library in its control flow: a library offers functions to be called by its parent code, whereas a framework defines the entire application design".
- 5) Choose a tag that fits best to your question: "JavaScript".
- 6) Submit the question by pressing the "ADD QUESTION" button.

Motivation: This design can be seen also on Stack Overflow, so it is familiar for students and teachers.

Scenario #12: Answering a question from the QA page;**Steps:**

- 1) Click the "QA" button that will redirect you to the QA page;
- 2) See a list of questions that can be answered;
- 3) Choose from the list of questions and answer it. E.g.: choose the question "JS frameworks", and in the answer box enter your opinion: "Some JS frameworks that I am aware of are: Angular, Ember, React, Meteor.";
- 4) Press the submit button to send your answer to that question;
- 5) Your answers can be rated as either being helpful or not.

Motivation: The design can be seen also on Stack Overflow, making it more familiar for students and teachers.

Alternative Scenario #1: Reviewing a fun fact

Description:

- A fun fact can be reviewed on the fun fact page (by navigating to the “Fun facts” page, scrolling over the fun facts, selecting one and clicking the “Like” / “Dislike” button).
- The fun fact of the day can also be reviewed (by navigating to the “Main page”, where the fun fact of the day appears, and similarly clicking on the “Like” / “Dislike” button).
- The difference between the two possible ways of reviewing a fun fact is the starting page (Main page / Fun facts page), whereas the reviewing mechanism is the same.

Alternative Scenario #2: Accessing personal statistics and rankings

Description:

- If the user clicks on the “View My Profile” button, the website will redirect him to his profile, where he/she can see his/her score, together with graphs on acquired skills and badges.
- If the user clicks the “Rankings” button on the navigation bar, he/she will be redirected to the leaderboard page, where it is displayed the user’s standings: score, badges, position (together with other user’s standings).
- Both actions give common information to the user (score, standing, badges), but in a different format and style.

5. Examples walkthrough evaluation

Walkthrough evaluation for Scenario #2: Solving quizzes;

- The user is trying to answer to the questions of the quizzes by completing it (selecting answer, completing the answer field), submitting it with the “Submit button” and receiving a feedback with the statistics and score.
- The user will see the correct control and the desired effect if it presses the “Submit” button, which will show him/her the score for the quiz and the rewards.
- Alternatively, if the user leaves the page, the progress will not be saved and the desired effect of completing the quiz and getting a score/ rewards is not achieved.
- The user receives a feedback after clicking on the “Submit” button with the results of the quiz. The user can proceed by either checking his/her profile or the global rankings.

Walkthrough evaluation for Scenario #3: Posting the fun fact;

- The User is trying to produce the effect of completing the form associated to the fun fact (title field, content field, links, tags, images, videos) and to submit the form in order for the fun fact to be posted on the “Fun facts” page.
- After completing the form accordingly and pressing the “Submit” button, the user will see the fun fact on the “Fun facts” page (the desired effect of posting a fun fact).
- Alternatively, if the user will leave the title and/or the content blank, he/she will not see the desired effect of posting a fun fact, because of the control is not a correct one.
- Instead, the system will warn the user with corresponding messages: “Title missing: Adding a title is compulsory for posting the fun fact!” After the users sees and acknowledges the error, he/she gets another chance to correct the mistake and fill in the title/content fields and post the fun fact. The user will understand the feedback and correct the mistakes.