

# Gamification in e-Learning

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## Abstract

Teaching learning process had involved to greater dimension in the past decade. The penetration and ease of availability has seen rise in use of e-Learning in the high education. e-Learning has provided a virtual platform for both learners and teachers to cater to the varied learner needs. The digital native, who is the current generation of learner find games as an interesting medium to learn. Gamification of learning has been to be a new approach to engage the digital learner in an efficient way.

## Keywords

Gamification; e-Learning; digital learner; open source tools; hot potatoes component.

## I. Introduction

Gamification has been part of marketing, customer engagement and many other sectors of industry. It is perceived as innovative approach to enhance the business model. Success and usage of games in the business sector is predicted to take upsurge in the coming years. Every field benefits through innovative or disruptive techniques and educational field is no different. Gamification is now seen as the new dimension which has been included to the field of education over past few years. The focus being on engagement and enhanced behavioral patterns Gamification can be defined as a process of engaging learners in an effective way through experiences which provide enhanced behavioral outcomes. It is application of gaming techniques to create scenarios which are apt to the learning content, thus motivating towards learning outcomes which are better than the traditional approach.

With the ease of availability and greater penetration of technology, online learning or e-learning is seen as an alternative to the traditional classroom teaching learning process. Current learners are digital natives and are more tech-savvy. To satisfy their learning needs e-learning provides a good platform. Many educational institutions across the globe have adapted to online learning and are offering courses and programs online.

e-Learning has advanced into a worldwide change operator in advancement of education. It has become more diverse in its form and applications. e-Learning has been characterized courses that are particularly delivered via the internet apart from classroom where the teacher is instructing. It is interactive in that you can likewise speak with your educators, teachers or different other students in your class. In the good old days it got an bad press, as many people thought bringing PCs into the classroom would remove that human element that some learners require, yet as time has advanced innovation has created, and now we grasp cell phones and tablets in the classroom and office, and as well as using a wealth of interactive designs that makes distance learning not only engaging for the users, as well as significant as a lesson delivery medium.

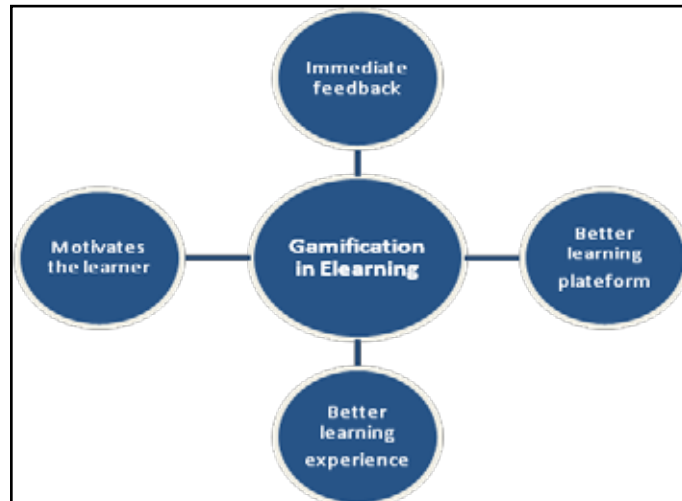
As the internet access is available in every part of the world which make it easy and closer and even thought the access to those eLearning website are nowadays free as there is a big world of business working behind it.

Moreover learning through the eLearning is more interesting as learning as the old fashion. As the number of people who concentrate is more in eLearning rather than a boring class. e-Learning offers students the flexibility to pick area, time and the method of learning at their own convenience. The e-Learning mode helps in the learning exercise for part-time students and

students and students in remote and inaccessible places all over the world by offering them more prominent adaptability as far as place and time.

1. At Fortune 500 firms, 73.6 percent of technology-delivered training comes through networked, online methods. (1)
2. Corporations can save up to 70% by replacing traditional training with eLearning (IOMA 2002). (2)
3. Over 18,000,000 college students are taking at least one of their classes online. By 2019 half of all classes will be done online. (3)
4. ELearning is \$56.2 billion industry. By 2015 this will grow into a \$107 billion market. (4) It makes it the fastest growing market in education industry.

## 1. Gamification



Gamification is a fashionable term. But what is gamification? As it happens in all new and expanding fields, there is no single unanimous definition, although most definitions incorporate a set of aspects that are widely accepted. The meaning of gamification is intricate and various and it likewise relies on upon the environment it comes from, scholastic or modern, since the principle center is on extremely distinctive perspectives. Its developing notoriety is coming from the belief in its potential to foster motivation, behavioral changes, friendly competition and collaboration in different contexts, such as customer engagement, employee performance and social loyalty.

Accordingly, it has been connected in different areas including marketing, healthcare, human resources, training, environmental protection and wellbeing. One key sector where gamification techniques are being explored is education. Gamification in

education refers to the introduction of game elements and gameful experiences in the design of learning processes. It has been embraced to bolster learning in a variety of contexts and subject areas, but also to address related attitudes, activities and behaviors such as participatory approaches, collaboration, self-guided study, completion of assignments, making assessments easier and more effective, integration of exploratory approaches to learning, and strengthening student creativity and retention.

The assumption here is that it is conceivable to join game mechanics in the plan of a learning procedure to connect with learners in a beneficial learning background, and more generally, to change their behavior in a desirable way.

## 2. How gamification is used in e-Learning?

In the field of eLearning gamification turns out to be progressively helpful and it helps learning and data maintenance. The question then is how to implement gamification effectively and to satisfy your desired objectives. The simplest definition of gamification is that its approach is to include typical elements of game playing (point scoring, rules, competitions and level) to different areas of activity. Gamification has marked advantages as it permits a business to meet its staff in a setting that they comprehend and with clear significant goals. In the field of eLearning gamification turns out to be progressively valuable and it helps learning and information retention. However gamification isn't implemented well and in fact, regularly doesn't meet the desired objectives.

There are various advantages to adding gaming components to your training materials inside the work environment including building up a specific ability, enhancing employee's health, and expanding learning maintenance. Gamification, when incorporated accurately, can make training campaign much more engaging and it's an inexorably mainstream method for advancing a business and its logic, and it's additionally being utilized to staff manufacture their very own brands. It's good idea however to mix up the competitive elements to your learning platform. Guarantee that there are rivalries between staff individuals, additionally encourage cooperation and contend with outside difficulties. Humans like to better themselves and feel that they are progressing towards something.

*There are two motivation types to consider:*

- Extrinsic Motivation

This is when a participant performs an action for an external reward.

- Intrinsic Motivation

A participant performs an action for a personal reward.

### (i). Ways in Which Gamification Leads To Mastery

#### Immediate Feedback

With gamification, students get immediate input by affirming their reaction to the material with a clarification or a clue for the understudy to attempt once more. It will show the student's dynamic score as he or she continues through different level. Anytime during the module, the student can review the input and attempt to enhance his or her results.

#### Hard Evidence

Gamification gives hard proof of student progress by gathering and putting away storing a record of it. The database to measures the student's success, what number of attempts or to what extent it took to accomplish it, and regardless of whether the student's

needs more practice to reach mastery. Parents who are interested about their student's advance can get to this information too.

#### Reward.

Gamification fortifies a feeling of achievement for students who achieve scholastic objectives by boosting them to the following level of learning. In this way gamification rewards students with new challenges and exercises while receiving badges identifications and tangible rewards too

#### Active, Not Passive, Learning.

Students learn by doing. Gamification stimulates learners to participate in what they learn rather than having to wade through volumes of overpowering content. Gamification scaffolds a subject to make it workable for learners to finish basic tasks and build upon them to gain knowledge.

### (ii). What Are The Benefits Of Gamification In eLearning?

#### 1. Better learning experience.

The learner can encounter "fun" during the game and still learn if the level of engagement is high. A good gamification technique with high levels of engagement will prompt to an expansion in in recall and retention.

#### 2. Better learning environment.

Gamification in eLearning gives a compelling, casual learning environment, and helps learners practice real life circumstances and challenges in a safe situation. This leads to a more engaged learning experience that encourages better information maintenance.

#### 3. Prompting behavioral change.

Points, badges, and leaderboards would definitely make preparing marvelous. Be that as it may, gamification is about significantly more than simply those surface level advantages. Gamification can drive solid behavioral change particularly when consolidated with the scientific principles of repeated retrieval and spaced repetition.

#### 4. Can be applied for most learning needs.

Gamification can be utilized to satisfy most adapting needs including induction and onboarding, item deals, client bolster, delicate abilities, mindfulness creation, and consistence.

#### 5. Impact on bottom line.

Because of every one of these perspectives that touch and effect learners (better learning experience, higher review and maintenance, catalyzing behavioral change, and so on), it can make a significant performance gain for organizations.

### (iii) Various platforms available to develop games.

#### 1. Duolingo

is a massive online collaboration which consolidates a free dialect learning site with a paid crowd sourced text translation platform. The service is designed so that students can learn a given language online, while helping to translate websites and documents. Beginners start with essential, basic sentences from the web, while advanced users receive more complex sentences. For every situation Duolingo gives the learning and interpretation devices to help the student to appropriately comprehend and retain the words that they experience. Every student can likewise vote on the nature of the other student's interpretations, giving important input to cognizance and learning. The top of the line interpretations for every sentence are made accessible for open

survey and accumulation. As students learn a language, they win ability focuses when lessons are finished or web substance is deciphered. Lessons connected with ability are progressively finished when a give number of interpretations are finished. Since web substance is intrinsically more intriguing than “made up” sentences, the interpretation assignments are additionally captivating.

## 2. Scratch

is a programming language that makes it simple to make your own interactive stories, animations, games, music, and art -- and share your creations on the web. As youngsters make and share Scratch projects, they learn important mathematical and computational thoughts, while additionally figuring out how to think innovatively, reason systematically, and work collaboratively. It includes extensive resources for educators.

## 3. Inform7

is a design system for interactive fiction based on natural language. Intelligent fiction gives the player a chance to investigate your universes and stories through text. Write adventure games, historical simulations, gripping stories or experimental digital art. Inform’s source reads like English sentences, making it uniquely accessible to non-programmers. It’s very easy to get started. Suitable for: Grade 5 - Year 12.

## 4. Alice

is a free and open source 3D programming environment designed to teach students object-oriented and event-driven programming. In Alice, students drag and drop graphic tiles in order to animate an object and create a program. Alice is extraordinary for making liveliness for telling a story, playing an interactive game, or a video to share on the web. Extensive support materials are provided. Suitable for: Grade 5 - Year 12

## 5. Marmalade

a strong and popular game dev tool for cross-platform native games and apps in C/C++ and deploy to both mobile and desktop. It supports both Android and iOS used by top developers, also has an asset store.

## 6. GameSalad

This game-development tool is almost as beautiful as the games it makes, and more than 65,000 games developed speak to its simplicity. Three of those, like Help Volty, even made it to the top of the US App Store.

## 7. Glest

is a free 3D real-time strategy game, where you control the armed forces of two distinct groups: Tech, which is mainly composed of warriors and mechanical gadgets, and Magic, that prefers mages and summoned creatures in the war zone. Lest is not just a game, but also an engine to make strategy games, based on XML and an arrangement of tools. Suitable for: Year 7 – Adult

## 8. MIT Open Courseware

Game Design. This course provides practical instruction in the design and analysis of non-digital games. Student cover texts, tools, references and historical context to analyze and compare game designs across a variety of genres, including sports, game shows, games of chance, card games, schoolyard games, board

games, and role-playing games. In groups, students design, develop, and altogether test their unique recreations to comprehend the communication and development of game rules. Student taking the graduate form finish extra assignments. Suitable for: Year 7-12 (Adapted)

## (iv) Tool available which can me make games online.

### 1. Game Maker (6)

The idea of “drag & drop” computing is the norm for most young computer users. Long gone are the days of “command lines” and understanding confusing file systems. As most computer operating systems and programs are adapting this new way of thinking and navigating, so has game creation.

Game Maker’s entire tool set is based on dragging and dropping commands. You simply code all the game’s actions and functions by dragging and dropping them onto characters and objects. Would-be game designers can even add their own art and music into the game. After following a few of the website’s tutorials, you’ll be making side scrollers, shooting and even 3D games in no time. Game Maker has been recently included in the National Video Game STEM Challenge through the “Activate!” project by PETLab at Parsons. Activate! It encourages young gamers to develop games that will help them to solve world issues.

### 2. Kodu (6)

For many, the idea of coding is still abstract. But lines of incomprehensible code can become the makings of a blockbuster game. To create a stronger connection and demonstrate how code affects game design, Microsoft introduced Kodu. The platform was created specifically for game development and can be launched on PCs and the Xbox 360. Kodu takes the intangible concepts of game design and expresses them in a more physical manner. “Coding” is done through a visual, branching selection tool and designers create their games by thinking in more “natural” terms and choosing options that affect what characters see and hear. Young developers can physically mold their game’s landscape and affect how things react in real time. These design choices make development on Kodu a more creative and expressive experience. To encourage children ages 9 – 17 to get into game design, Microsoft recently announced The Kodu Cup.

### 3. Little Big Planet 2(6)

If there’s any indication that the idea of “game-based learning” is gaining more traction, we just need to see how the commercial gaming industry is getting involved. Little Big Planet for the PlayStation 3 was one of the system’s first runaway hits. This open ended game creation and community-sharing game proved that Sony’s new console had the power and the community to propel A-list games like this into new arenas. With the introduction of Sony’s new gesture-based game controller “Move” and the launch of Little Big Planet 2, Sony decided to take the game into the classroom. Together with the game creators, Media Molecule, Sony will be introducing a downloadable “Teachers Pack” for Little Big Planet 2. Using the game’s robust game making tools and realistic physics engine, teachers will be accessing and creating levels that address STEM subjects, and are in line with national standards. The combination of a powerful multimedia device and an advanced motion sensing controller can provide educators with new tools to engage their students in the 21st century.

#### **4. Adobe AIR – what remains of Flash (7)**

In 2007 Adobe seemed to be winning the casual games runtime battle, with Flash having become the defacto standard for games on the web and Flash Lite almost ubiquitous on more advanced mobile devices. Then the iPhone came along and Steve Jobs said it wasn't going to support Flash. This knife wound wasn't immediately fatal but Flash has been slowly bleeding to death ever since. By 2011 Adobe eventually produced a version of AIR that compiled Flash to native iOS apps but by then the damage was done. Android initially supported Flash, poorly, in the browser but Adobe eventually gave in and stopped developing the browser plugin to focus on AIR. There are still a lot of Flash developers in the world, 15% of mobile game developers use it and 6% of them as their primary tool. It's also still, just about, the only way to target rich gaming experiences to the majority of the world's desktop web browsers. Adobe is now focusing on tools for HTML5 developers and Flash/AIR has not really evolved in a long time. Given this background, I won't focus on detailed technical pros and cons as with the other tools. Adobe AIR applications are developed in Flash, coded using ActionScript. There's an integrated web view which can be targeted with HTML, CSS and JavaScript. It's also possible to build native extensions for AIR apps, individually for each targeted platform.

#### **5. Cocos2D**

Cocos2d is, as the name proposes, a 2D games engine. It began around the same time as the iPhone SDK and quickly switched to Objective-C, growing in popularity as the best free and open source option for mobile games. However,, Apple released their own highly performance optimized 2D motor for Objective-C designers called Sprite Kit. That, alongside the ascent of Android, has made the concentration of Cocos2d advancement move towards the cross-stage Cocos2d-x branch written in C++. The Cocos2d group of engines is the most prevalent open source alternative on the planet, utilized by engineers in our overview and by their essential device.

There are different versions of Cocos2d accessible in Objective-C, C++, C #, Java, JavaScript and Ruby. As specified over, the C++ form is the most effectively kept up, it additionally has the amplest scope of bolstered stages. There are likewise scripting language bindings to the C++ version in both Lua and JavaScript, empowering designers to write in their favored scripting language yet get the full native performance of the underlying engine.

#### **(V). Online tools to create games for education**

##### **A. Open Source**

###### **1. Code.org (8)**

Code.org is a non-profit organization and eponymous website led by Hadi Partovi that aims to encourage people, particularly school students in the United States, to learn computer science. The website includes free coding lessons and the initiative also targets schools in an attempt to encourage them to include more computer science classes in the curriculum. On December 9, 2013, they launched the Hour of Code 2013 nationwide to promote computer science during Computer Science Education Week until December 15, 2013.

###### **2. Teacher with portals**

This lesson is intended to teach students the role of game mechanics

within a game.. Start by disclosing to the students that a Rube Goldberg machine is a gadget which utilizes a unimaginably complex arrangement of ventures so as to accomplish a basic objective. Challenge the students to utilize every single accessible apparatus in the Portal 2 Puzzle Maker to create their own puzzle, with the goal being to move a cube from one end of a room to the next utilizing whatever number strides as could reasonably be expected dependably with practically no player interaction. Use to show complex subjects like maths and material science and it is a free instructive accumulation of riddles and educator made substance from Valve's top rated game, Portal 2, an engaging 3D puzzle-solving game. In view of Valve's innovation, the Portal 2 Puzzle Maker happens in a domain with reasonable material science – a play area rich with open doors for instructive fun.

#### **3. ClassTools**

More than 20 free web instruments for teachers create quizzes, diagrams, and educational games; you can have them all alone website complimentary (authorized under inventive basic). Plus there won't be any log in. There are additionally pre-made games on ClassTools.net which teachers will find useful. It is an open source, simple to handle, easy to understand, intuitive, for example, the Pac man even comprise of various kind of level and different types of games.

#### **4. Purpose Games**

It allows users to create custom games, share, and play?It can create basic multiple choice game, or naming place marks on the image or map that you create. It is user friendly.

#### **5. Parade of Games**

It furnishes teachers with games and game templates for classroom use, can be downloaded in PowerPoint format, including Bingo, Jeopardy, and scavenger hunts. The Parade of Games site was made to furnish educators and trainers with easy-to-assemble educational games in a technology-enhanced environment to support key learning points. The site exhibits the creative use of popular game shows and other familiar games to reinforce learning. Teachers and coaches can choose and download those PowerPoint recreations that support their learning objectives and are good with the innovation abilities of their learning surroundings. With a specific end goal to gather instructive recreations in an innovation improved environment to bolster key learning focuses. The site exhibits the inventive utilization of prevalent diversion appears and other well-known amusements to fortify learning. Teachers and mentors can choose and download those PowerPoint recreations that bolster their learning targets and are good with the innovation capacities of their learning surroundings. So as to help the instructor/mentor to choose the games that fit their objectives a matrix tying the games to specific learning objectives is provided. The matrix utilizes the following variables for decision-making.

#### **6. Sploder**

Sploder is a web-based game creation tool that actually contains five individual sub-tools, each one dedicated to creating a different game type: Retro Arcade, Platformer, Physics Puzzle, Classic Shooter, and 3D Adventure. There's likewise an extra tool, Graphics Editor, for making your own craft resources. With Sploder, you can make different levels; put things all through those levels, and control adversaries. You'll have to make a free Sploder account

in the event that you need to spare your diversions, however a short time later you can share the recreations you make so other Sploder clients can find and play them.

These free diversion improvement programming instruments depend on Flash and use a simplified interface for convenience. It actually does not get any less demanding than this! Sploder is perfect for first-time game creators who want to learn the concepts and skillsets necessary for high-level game development before tackling more difficult topics, like coding and scripting.

## 7. Educaplay

Educaplay resembles an incredible free (similarly as I can tell, at any rate) instrument where you can undoubtedly make a huge amount of various types of educational interactives that you can connect to or insert in your site. These include:

- Riddles
- Crosswords
- Word search Puzzle
- Fill in the texts
- Dialogues
- Dictations
- Jumbled Word
- Jumbled Sentence
- Matching
- Quizzes
- Maps

## 8. ProProfs(Online Brain Games & Puzzles)

Play exciting online puzzles and brain games at ProProfs or make a one of a kind one. You can likewise make your own brain teasers, trivia or online puzzle games and share it with friends. Combine fun with learning, test and upgrade your brain's processing velocity and execution. You'll cherish it!

- Create games
- Free and simple (no html experience)
- Sharper Memory
- Learn new skills
- Get creative
- Improve decision
- Brain fitness
- Learn complex idea in a way of engaging
- Free of cost open source
- Use flash cards

## 9. Hot Potatoes

These JavaScript-based recreations are currently accessible as freeware (free programming!). The Hot Potatoes suite incorporates six applications, empowering you to make interactive multiple-choice, short-answer, jumbled-sentence, crossword, matching/ordering and gap-fill exercises for the World Wide Web. Hot Potatoes is freeware, and you may utilize it for any reason or project you like. It is not open-source.

## 10. Fixel

Fixel is completely free for both individual and business utilize, birthed any semblance of Canabalt and other Flash-based hits that much of the time wind up on our best-of diversion records. It's developed starting from the earliest stage ActionScript 3, the third form of the of the question arranged programming language designed for controlling 2D vector movement, however is good with a wide determination of free advancement instruments that

render the product a standout amongst the most adaptable to date. Fixel sparkles when making film-strip style movements and 2D side-scrollers that component a moderately settled point of view, yet is not fit for handling the complex universe of 3D displaying and level outline. It utilizes tile maps to make levels is natural and satisfying, just like the plenty of camera capacities, the pathfinding plan, and the capacity to spare recreations. Fixel increment the expectation to absorb information (C-styling programming learning helps), however that shouldn't be a major deterrent since the program is free and resourceful

## B. Propriety Tools

### i) RPG Maker VX Ace, IG Maker, and GG Maker

RPG Maker VX is a program for making 2D, sprite-based pretending diversions in the vein 90s Final Fantasy and Dragon Quest games. RPG Maker VX Ace is accessible specifically from their site, and additionally on Steam, for \$69.99, yet a trial form is accessible as well. RPG Maker VX could be an incredible approach to acclimate yourself with the ideas of level and battle configuration, and narrating and how to adjust these angles in your game. IG creator takes into consideration more adaptability than RPG Maker with regards to visuals and gameplay, yet is still somewhat constrained as far as exactly the amount you can do with your games. That's not to state IG Maker isn't a decent alternative for making games; indeed, the confinements forced on the client really makes it harder to "break" a game. You'll need to take in some basic coding here and there keeping in mind the end goal to get the most out of your diversion.

### ii) Construct 2

Construct 2 is a flexible HTML5 game creation engine intended for quick advancement of 2D games. While the traditional flow of game improvement can be troublesome for beginners to handle, Construct 2 makes it simple by abstracting a portion of the ideas outwards. You should simply drag-and-drop entities into a level, and then add events and behaviors to each entity. Voila, it's as simple as that. The Construct 2 free game development software is instinctive and uncluttered, so absolute beginners will have a generally simple time conforming to it. Veteran absolute beginners can even now advantage from Construct 2, as well, by utilizing it to make amazingly quick models of potential game ideas. Considerably more great: with a single project, you can export to various different platforms. The HTML5 engine that powers Construct 2 permits immediate support for Chrome, Firefox, Kongregate, Face book, and New Grounds. Utilizing wrappers, you can likewise export to PC, Mac, Linux, Android, iOS, and Windows Phone.

### vi) Comparison Table

The table below shows a comparison on all the games from different research papers. It is based on open source and the propriety tools which are available online. It is classified as follows:

- Easy to use
- Portability
- Interactive
- Engaging
- Customizable

Table 1 : Comparison table

Tools	Easy to use	Portability	Interactive	Engaging	Customizable
Code.org	✓	✗	✓	✓	✓
Teacher with portals	✓	✗	✓	✓	✗
Class Tools	✓	✓	✓	✓	✓
Purose Game	✓	✓	✓	✓	✓
Parade Of Games	✓	✓	✗	✓	✓
Sploder	✓	✓	✓	✓	✗
Educa-play	✓	✗	✓	✓	✓
ProProfs	✗	✓	✓	✗	✓
Hot potatoes	✓	✓	✓	✓	✓
Flixel	✓	✓	✓	✓	✓
RPG Maker	✗	✓	✓	✓	✗
Con-struct2	✗	✓	✗	✓	✗
Game Maker	✗	✓	✓	✗	✓
Stencyl	✓	✓	✓	✓	✓
Unity 3D	✓	✓	✓	✓	✓
Jeopardy	✓	✓	✓	✗	✓

**i) Easy to use**

Easy have define Easy as a game which is very user friendly, where any age of students can easily manipulate the gamification in ELearning . It consider of easy rules, simple coding and easy to learn.

**ii) Portability**

According to all the research papers portability is the major factory, where any students or any teachers can easily open the game online in any platform without any restriction.

**iii) Interactive**

When it comes in the term interactive, interactive means something which make the player/students or the teacher to give them 100% of their concentration. According to the paper it show that gamification make a students to concentrate and give them a better way of learning. This is a good way where the students can get a feedback after playing the game, so that he/she can make out what is missing in his/her learning.

**iv) Engaging**

Engaging portrays the game that keeps the gamer or user engaging by rewarding both big and small accomplishments. More over it allow the user the share their accomplishments of the achievement on the social network. Make it challenging but not frustrating, games that are easy are meant to be boring and games which are difficult are meant to be frustrating.

**v) Customizable**

Customizable according to the paper point of view customizable intend to be a game which is online and can be easily modified. The game will be customizable in any situation or any point of view.

**vii ) Conclusion**

Gamification and e-learning provide teaching learning a new dimension. This creates an engaging and interesting platform for learners. The spectrum of tools available to create the games and learning materials are vast. The paper tries to provide generic understanding of the various tools and platforms available. To ensure the teaching learning process is effective, the games embedded in online learning systems should be apt. Designing games is a complex and tedious process. The tools discussed in this paper try to facilitate the teacher in creating e-content.

**Reference**

[1] Mullich, Joe. "A second act for e-Learning." *Workforce Management* 83.2 (2004): 51-55.

[2] Villagrasa, Sergi, et al. "GLABS: Gamification for learning management systems." *2014 9th Iberian Conference on Information Systems and Technologies (CISTI). IEEE, 2014.*

[3] Galagan, Patricia A. "The e-Learning revolution." *Training & Development* 54.12 (2000): 24-24.

[4] *Students Designing Video Games about Immunology: Insights for Science Learning* Neda Khalili, Kimberly Sheridan, Asia Williams, Kevin Clark, Melanie Stegman *Computers in the Schools* Vol. 28, Iss. 3, 2011

[5] Reeves, Byron, et al. "Leveraging the engagement of games to change energy behavior." *Collaboration Technologies and Systems (CTS), 2012 International Conference on. IEEE, 2012.*

[6] Westecott, Emma. "Crafting play: little big planet." *Loading...* 5.8 (2011).

[7] Liu, Xin, et al. "Design and implementation of an office automation assistant utility using adobe AIR technology." *International Symposium on Integrated Uncertainty in Knowledge Modelling and Decision Making. Springer Berlin Heidelberg, 2013.*

[8] De-Marcos, Luis, et al. "An empirical study comparing gamification and social networking on e-Learning." *Computers & Education* 75 (2014): 82-91.

[9] Shi, Lei, et al. "Contextual gamification of social interaction—towards increasing motivation in social e-Learning." *International Conference on Web-Based Learning. Springer International Publishing, 2014.*

[10] Gåsland, M. M. (2011). *Game Mechanics based e-Learning. Trondheim, Norway: Norwegian University of Science and Technology.*

[11] Hamari, Juho, Jonna Koivisto, and Harri Sarsa. "Does gamification work?--a literature review of empirical

- studies on gamification." 2014 47th Hawaii International Conference on System Sciences. IEEE, 2014..*
- [12] Glover, Ian. "Play as you learn: gamification as a technique for motivating learners." (2013): 1999-2008.
- [13] Swacha, J. "Gamification-based e-Learning Platform for Computer Programming Education,(2012)." (2013).
- [14] Dicheva, Darina, et al. "Gamification in education: a systematic mapping study." *Educational Technology & Society* 18.3 (2015): 1-14.
- [15] Ibanez, Maria-Blanca, Angela Di-Serio, and Carlos Delgado-Kloos. "Gamification for engaging computer science students in learning activities: A case study." *IEEE Transactions on Learning Technologies* 7.3 (2014): 291-301.
- [16] Tlili, Ahmed, Fathi Essalmi, and Mohamed Jemni. "An educational game for teaching computer architecture: Evaluation using learning analytics." *2015 5th International Conference on Information & Communication Technology and Accessibility (ICTA). IEEE, 2015.*
- [17] Virvou, Maria, and Spyros Papadimitriou. "Playing, learning, extending: Educational "Guess Who" game that is renewable by a teacher." *Information, Intelligence, Systems and Applications (IISA), 2015 6th International Conference on. IEEE, 2015.*
- [18] Echeverría, Renato, and Francisco Jurado. "Using player profiles and learning styles in the design of Educational Games." *Computers in Education (SIIE), 2015 International Symposium on. IEEE, 2015.*
- [19] Margalit, Oded. "Using Computer Programming Competition for Cyber Education." *Software Science, Technology and Engineering (SWSTE), 2016 IEEE International Conference on. IEEE, 2016.*
- [20] Bueno, David, Jose Chacón, and Cristina Carmona. "Learning to teach sports to handicapped people using games." *Advanced Learning Technologies, 2008. ICALT'08. Eighth IEEE International Conference on. IEEE, 2008.*
- [21] Hatzilygeroudis, Ioannis, Foteini Grivokostopoulou, and Isidoros Perikos. "Using game-based learning in teaching CS algorithms." *Teaching, Assessment and Learning for Engineering (TALE), 2012 IEEE International Conference on. IEEE, 2012.*

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