

# The Game with Impact: Gamification in Environmental Education and Entrepreneurship

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## Abstract

Gamification is the concept of applying game elements and mechanics in non-game contexts, such as marketing, education, entrepreneurship, etc. The concept is not new, but it has started gaining momentum only recently. There are applications of gamification in research, innovation management, learning, and creation of real positive social and environmental impact. Such applications can also be found in environmental education, and these are the focus of the present article.

The article describes the research and experience of Moldovan Environmental Governance Academy (MEGA) in applying gamification to learning on the topic of sustainable development for youth and supporting them in starting their green businesses. Firstly the reader is presented to the current state of environmental and entrepreneurial education on the case of Moldova. Then he/she learns about gamification as one of the modern approaches to improve the quality and attractiveness of learning. The theory is then backed by case studies of projects organized by MEGA in this regard: G.R.E.E.N. and the Game with Impact. These case studies include the gamification methods and tools applied and the participants' learning performance and environmental impact achieved due to them.

The article concludes with lessons learnt and recommendations on how to use gamification in environmental education and entrepreneurship.

*Keywords:* Gamification, environmental education, impact, MEGA, social entrepreneurship.

## 1 Introduction

We now live in the Era of Anthropocene. This how more and more scientists define the current epoch – the epoch, when mankind has become the dominant geological force on the planet Earth (Foley et al., 2013). It indicates that altogether humans produce environment-altering changes throughout their existence. Unfortunately, in most cases these changes are not in favour of the environment, thus leading to such sustainability issues as climate change, overextraction of natural resources, deforestation, waste pollution, etc. There is a growing number of approaches and techniques now applied to mitigate the consequences of anthropogenic changes, as well as stimulate more sustainable and environmentally friendly behaviour. All of them are based on such pillars as raising awareness about the issues, economic incentives, legal instruments, social pressure, and infrastructure. However, the most basic and at the same time the most powerful behaviour-changing foundation for efficient environmental management and sustainable development is environmental and entrepreneurial education (Iscenco, Movila, Borodziuk, 2014).

Still in spite of their crucial importance in dealing with environmental issues, improving the state of the environment, and secure sustainable development, the current quality of environmental and entrepreneurial education is heavily criticized (Smith, 2000). Most of this critique targets the outdated theory-based methods and approaches still used here, lack of “evidence-based” approach, weak connection between students’ individual actions / personal responsibility and the environmental condition in real time, weak or no interaction of students with important economic actors in sustainable development and their eco-innovations, no direct measurement of the impact of environmental education on individual behaviour, and so on (Blumstein, Saylan, 2007). The research conducted by the Moldovan Environmental Governance Academy (MEGA; [www.megageneration.com](http://www.megageneration.com)) in the Republic of Moldova confirms this fact and shows that is dominantly public school and university courses that fail to provide efficient environmental and entrepreneurial education in this country. The research results also point out to the growing demand for project based education expressed by Moldova students. And one of the most efficient approaches to address the challenges that environmental and entrepreneurial education face nowadays, as well as deliver project based learning to students is argued to be *gamification* – the use of elements of game design in non-game contexts (Deterding, 2011).

Thus, in this paper we explore and discuss the approach of gamification as a possible and efficient solution for addressing current problems in environmental and entrepreneurial education mentioned above. Firstly, we describe the state of environmental and entrepreneurial education in the world. We support the theory with empirical evidence from our research in Moldova. Secondly, we explain the notion of gamification and present the project G.R.E.E.N. that was organized by MEGA and our partner organization Medium in Moldova as a case study of applying gamification in environmental and entrepreneurial education. Thirdly, we describe the advantages and disadvantages of the approach based on lessons learnt from G.R.E.E.N. And finally we conclude the paper with our recommendations on how to apply gamification to educational initiatives on environmental management and entrepreneurship.

## **2 State of Environmental Education and Entrepreneurship**

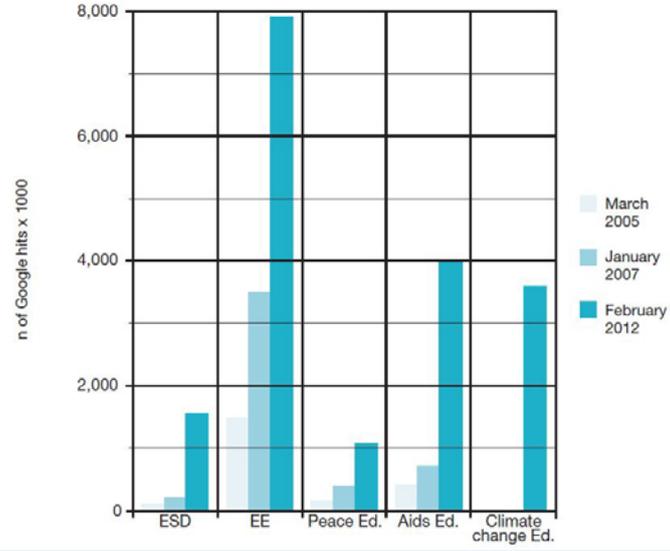
Environmental education (EE) is defined by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) as the learning process that increases people’s knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action. UNESCO is responsible for evaluating and monitoring the progress throughout the UN’s Decade of Education for Sustainable Development (DESD, 2005 – 2014). Education for Sustainable Development (ESD) is the practice of teaching sustainable development which is defined by the UN Commission Report (1987) as development that meets the needs of the present without compromising those of future generations. This general definition leads to the inclusion of many adjectival educational topics within ESD such as EE, peace education, AIDS education, climate change education (CC), etc. EE is a major aspect of ESD as it provides the necessary awareness and technical knowledge to solve environmental problems and ensure a sustainable environment for future generations.

Entrepreneurship education refers to the teaching of entrepreneurship or the training of entrepreneurs. One definition for entrepreneurship is the capturing of ideas, converting them into products or services, and building a venture to take the concept to market with the inclusion of risk taking, pro-activity, and innovation as key elements. (UNESCO, 2012). The

importance of entrepreneurship education stems from the focus of using entrepreneurship to stimulate economic development around the globe through the contribution of small firms and job creation.

### 2.1 Sustainability and Entrepreneurial Learning around the Globe

In recent years EE was the most recognized related field of ESD as represented by the number of ‘hits’ found through Google searches throughout the DESD. The results are shown in Figure 1, where the EE field has grown approximately 100% from 2007 to about 8,000,000 hits in 2012. Note that this growth also includes the increased rate of digitization over the years (UNESCO, 2012).



**Figure 1:** Representation of ESD and related adjectival educations shown by the number of Google ‘hits’ (UNESCO, 2012)

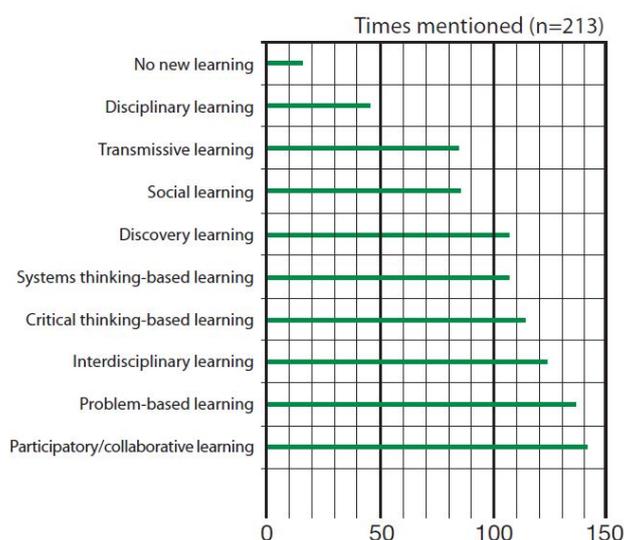
Throughout the DESD there has been a pedagogical shift in EE and other ESD related education fields. This is shown by an increase in alternative and innovative forms of teaching and learning. UNESCO has distinguished nine forms of learning for EE and other ESD related education fields which are defined in Table 1.

Learning Form	Description
Discovery	Learners immersed in rich context where the mystery encourages exploration to make sense of the experience
Transmissive	Learners obtain knowledge or a set of rules through didactic skills (presentations, lectures, etc.) and supporting materials (workbooks, visuals, etc.)
Participatory / Collaborative	Learners learn through active participation in groups where there is generally a focus on resolving a joint issue or task
Problem-based	Learners learn by solving real or simulated problems to understand issues (either provided or self-chosen) and find ways to make real-life improvements.
Disciplinary	Learners choose a specific discipline as a starting point to better understand the underlying principles and expand the knowledge base of that discipline.

Interdisciplinary	Learners take problems as a starting point and explore them from different interdisciplinary perspectives to create possible integrative solutions.
Multi-stakeholder Social	Learners with different backgrounds, values, etc. are brought together to initiate a learning process and set-out on a creative quest to solve open-ended problems.
Critical Thinking-based	Learners are exposed to the assumptions and values that people, organizations, and communities have and challenging them to promote reflection, debate, and rethinking.
Systems Thinking-based	Learners look for connections, relationships, and interdependencies to understand the whole system and recognize the effects of changing aspects within the system.

**Table 1:** Different forms of learning for EE and other ESD related fields (UNESCO, 2012)

The popular learning forms for EE and other ESD related fields throughout the world are participatory/collaborative learning, problem-based learning, and interdisciplinary learning. The complete rankings are shown in Figure 2. These results were obtained through UNESCO's Global Monitoring and Evaluation Surveys (GMES) where 213 respondents from 102 countries participated. Many respondents of this survey commented that there must be a mix of educational learning forms that must be optimized for different demographic groups, the learning topic selected, and the resources available in order to maximize the effectiveness of education. The GMES also showed that EE and other ESD related fields are more represented within higher education, primary education, and secondary education and least represented in early childhood development and the commercial / private sector (UNESCO, 2012).



**Figure 2:** GMES results for ESD learning forms in their countries with 213 respondents from 102 countries. (UNESCO, 2012)

Entrepreneurship education has been a popular topic of research and several insights have arisen from previous studies as described in Table 2. These insights show the recent trends in entrepreneurship education and research. Future trends in entrepreneurship education include determining the most effective content and methodology, increasing education efforts in opportunity recognition, further research on learning from advisors, and in which context entrepreneurship education is most effective (ex: college, high school, etc.) (Mason, 2011).

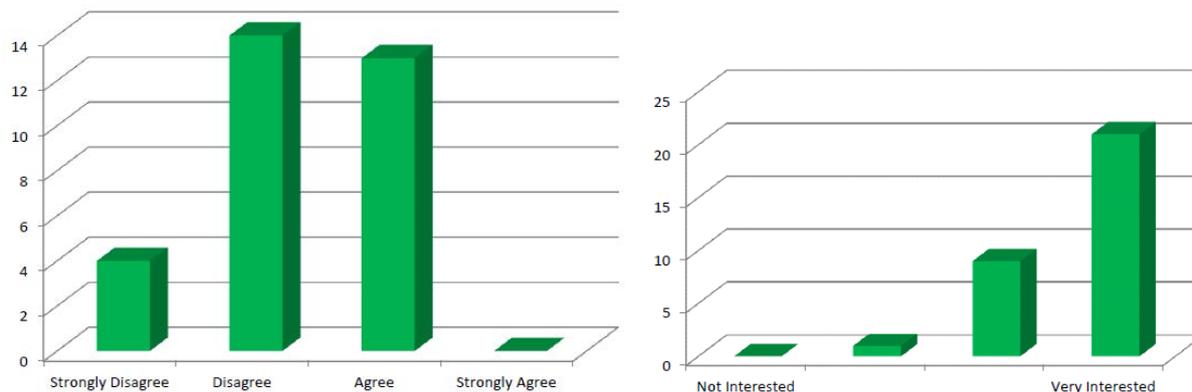
#	Insight Description	Reference
1	Corporate entrepreneurship and the need for entrepreneurial cultures have become more prominent in the late 1990's	Kuratko, Ireland, and Hornsby, 2001
2	There has been enormous growth of interest in entrepreneurship around the world in the past few years	Peng, 2001
3	Economic and social contributions of entrepreneurs, new companies, and family businesses make immensely disproportionate contributions to job creation, innovation, and economic renewal compared to the 500 largest companies.	Charisma, J.J., Chua, J.H. and Sharma, P. 2003
4	Entrepreneurial education is one of the most popular topics in U.S. business and engineering schools	Kuratko, 2003
5	The psychometric tool EMAQ has been statistically validated and can be used to determine an individual's leaning towards entrepreneurship	Deamer and Earle, 2004
6	There is a lack of uniformity in entrepreneurship education and there should be an initial specification of programme objectives combined with a mix of both objective and subjective evaluation.	Henry et. Al. 2005
7	Entrepreneurship education is seen as an economic tool to stimulate development and differs based on a regions' economic, political, cultural, and historical perspective. In many regions, entrepreneurship is new and institutions with a short history of entrepreneurship education have trouble building legitimacy and support as well as gathering resources. A global network of entrepreneurship education where best practices can be shared is essential for future programs.	Seelig, 2005
8	Individuals do not all possess the same proficiency in recognizing entrepreneurial opportunities and academic career training has an influence in this ability.	Craig et. al. 2006
9	Providing entrepreneurship training is only effective if there is adequate infrastructure, economic stability or market and technological readiness.	GEM & GERA, 2010

**Table 2:** Previous insights obtained from entrepreneurship education research studies

These are the current results for both environmental and entrepreneurship education around the globe. As shown above, there is a large difference in program development as entrepreneurship education is a fairly recent topic compared to environmental education.

## 2.2 The Case Study of the Republic of Moldova

In May – July 2014 MEGA conducted a research on the state of environmental and entrepreneurial education in the Republic of Moldova. A survey with over 30 participants was completed to have an initial understanding of the EE by the Moldovan population. Participants in the survey were college / university students from 7 major universities located in various regions in Moldova. Additionally, there was a wide range of variation with the participants' academic backgrounds. This included over 10 different academic backgrounds such as Business Administration, Ecology, Medicine, Politics, IT, International Relations, etc. These participants were approached through the network of the MEGA partner AIESEC Moldova, and they form the group of the MEGA's "early adopter" customers. Topics explored in this survey include population perspectives on environmental and entrepreneurship education.



**Figure 3:** Response distribution for the statement "School courses are adequate at teaching skills" (left) and for the educational system incorporating project based learning (right)

The results of the research show that 84% of the respondents are aware of the current environmental issues in Moldova and express interest in improving the quality of the environment in the country. The main learning source on the state of the environment is the school system followed by other programs / conferences and personal research. However, the majority of the survey participants believe that the school system is inadequate at providing knowledge and skills required for efficient environmental management and entrepreneurship: 58% of the students either disagreed or strongly disagreed with the statement "School courses are adequate at teaching skills." There was also overwhelming demand for project based learning, where 68% of the participants showed the highest level of interest for incorporating a practical and engaging program into the school curriculum.

Next steps in fully defining the status of environmental and entrepreneurship education in Moldova is to develop a quantitative benchmark for knowledge levels in both fields as well as obtaining larger sample sizes.

### 3 Gamifying Environmental Education in Moldova

*Gamification* is defined as a concept of applying game design and mechanics to a non-game context. This is a psychology- and motivation-based approach to increase the motivation, engagement and contribution of the target audience, as well as achievement of the necessary results through their active involvement (Iskeno, 2014). Nowadays it is applied to EE as well, ultimately taking the form of environmental "serious games" when the experience of learning about environmental management and governance is designed as a whole integrated game with its story, levels, progression, key challenges, and mastery status.

#### 3.1 Why do we Gamify?

There are already many cases of gamifying environmental and entrepreneurial education. As an example one could mention *RecycleBank* – a collaboration platform aiming at stimulating eco-friendly lifestyle and increasing the rate of recycling in society. It uses such elements of gamification, as points and rewards, to increase people's engagement into recycling and stimulate environmentally correct behaviour. RecycleBank also has an on-line library, where platform users can learn more about eco-lifestyle, sustainability, and recycling.

At MEGA we have decided to use the concept of gamification as well and apply it to environmental and entrepreneurial education in Moldova. The reasons for it are common for many other applications of gamification and include:

- Gamification is a powerful engagement and motivation tool based on the recent developments in psychology, communication, design, and accelerated learning;
- It creates opportunities for experiential learning, which is considered more effective than traditional didactic teacher/student teaching (Sandbrook et al., 2014);
- Gamification allows repetitive play, which exposes gamers to more opportunities for learning than in traditional education (Sandbrook et al., 2014);
- It stimulates active interaction between peers and peer-to-peer learning;
- Gamification allows constant monitoring of players' performance and learning results, as well as gives their immediate feedback on each learning activity;
- It is the tool that compared to other learning instruments (such as lectures, workshops, case studies, etc.) ensures the longest retention of information and knowledge obtained (Townsend, 2003).

Thus, motivated by the above-mentioned reasons and willing to test them, we developed the gamification-based project G.R.E.E.N. that was realized in spring 2014 in Moldova.

### **3.2 Case Study: Project G.R.E.E.N. and the Game with Impact**

The project G.R.E.E.N. (Garbage Recycling and Environmental Education Nationwide) is a national educational initiative on environment protection and green entrepreneurship with the focus particularly on waste prevention and management. It was organized in February – June 2014 in 3 large cities in Moldova (Chisinau, Balti, and Comrat) by MEGA and our partner organization Medium.

The gamification process and elements applied in G.R.E.E.N. can be described by using *Werbach's 6D gamification framework* (Werbach, Hunter, 2012):

#### 1) Define goal and objectives:

The goal of the G.R.E.E.N. project was to develop the capacity of 300 young people from 3 cities in Moldova in environmental management, governance, and entrepreneurship, and support them in establishing their own environmental and entrepreneurial initiatives in the country in 2014. The objective of implementing gamification within the project was to maintain at least 90% participation rate of these young people throughout G.R.E.E.N. and increase their motivation and engagement in environmental management and entrepreneurship during and after the project.

#### 2) Delineate target behaviours:

By introducing gamification in G.R.E.E.N. we aimed to achieve the following behaviour changes in the targeted youth: 1) the participants should manage their waste streams more efficiently by prioritizing waste prevention, reuse, and separation at the source rather than simple dumping; 2) they should communicate the benefits the environment gives to the society and the need to protect it to their peers; 3) the players should organize their own environmental initiatives and certain number of them should engage in environmentally-responsible entrepreneurship afterwards.

### 3) Describe the players:

The category of young people targeted with the G.R.E.E.N. gamification design is pupils of classes 10 – 12 from 3 schools in the cities Chisinau, Balti, and Comrat. According to *Bartle's Player Type Model* (Werbach, Hunter, 2012), the G.R.E.E.N. participants are mostly *Achievers* aiming at reaching certain level of knowledge, experience, and status and *Socilaizers*, who would like to benefit from the project through networking and interacting with their peers. This implies that in project gamification it is appropriate to use the elements offering progression and skills / experience acquisition, as well as social interaction and teamwork experience.

### 4) Devise activity loops:

In order to connect the project gamification objectives, desired behaviours, and types of players targeted, we devised the engagement and progression loop for G.R.E.E.N.: a) engagement loop served the purpose of attracting new players to the gamification process and in our case featured initial points and free on-boarding trainings given to the players, engagement of current players with their peers in off-line missions, and word-of-mouth marketing; b) progression loop secured active engagement of current players and included the categorization of game missions into different levels with increasing difficulty, bonus missions giving special awards and statuses, and the ultimate goal of reaching the G.R.E.E.N. Agent status and receiving the award of all-expenses-covered excursion and summer school on green entrepreneurship in Moldova.

### 5) Don't forget the fun:

In order to provide an interesting and engaging learning experience, the gamification design needs to feature one important psychological element – fun. In the G.R.E.E.N. project fun was added in the form of: a) a storyline of waste pollution invading Moldova and the experience of youth as secret agents saving the country; b) collaboration and networking in accomplishing game missions; c) exploration of different approaches and tools to complete the missions, as well as freedom of choice to select the bonus ones; d) competition of the G.R.E.E.N. Agent status and rewards.

### 6. Deploy the appropriate tools:

Finally, to connect all the above-mentioned elements of gamification framework, one needs to design and deploy the suitable and relevant tools and mechanics. Within the G.R.E.E.N. project they included: engaging storyline, progression levels, bonus missions with special skills badges (made physically for the players to actually wear them), experience points, leaderboard shown on the project website, sharing of players' achievement on the project pages in social networks, and G.R.E.E.N. Agent status and rewards.

The results of applying gamification within the G.R.E.E.N. project in terms of participants' learning performance and environmental impact were the following:

- Among the 300 targeted young people 104 (34.7%) of them became actively engaged in the learning experience within the G.R.E.E.N. project thus benefitting from all trainings and workshops and developing their knowledge in environment protection;

- Among these 104 youths 70 (67.3%) accomplished all game missions and obtained the G.R.E.E.N. agent status and rewards, indicating that they are prepared for efficient environmental leadership and management;
- Among the 70 G.R.E.E.N. Agents 27 (38.6%) of them voluntarily took on and accomplished bonus missions, meaning that they became highly motivated and engaged in addressing environmental issues in their regions;
- During and after the project 7 teams of the newly trained G.R.E.E.N. Agents were able to successfully organize their own environmental projects and initiatives focused on raising awareness about waste pollution and training peers in efficient waste management in their educational institutions;
- The overall impact of the G.R.E.E.N. project is represented by the fact that 0.01% of Moldovan population is now aware about the waste issues and has started practicing waste separation at the source, and that there is a 0.003% reduction in annual waste generation and dumping in the cities of Chisinau, Balti, and Comrat;
- Furthermore, 12 (17%) of the G.R.E.E.N. Agents expressed their desire to become the organizers of the next edition of the G.R.E.E.N. project, thus ensuring its continuity and scaling up of its impact.

### **3.3 Lessons Learnt and Next Steps**

Besides the contribution of the G.R.E.E.N. project to education on environmental management and entrepreneurship in Moldova, it also provided valuable outputs and lessons regarding the implementation of gamification in EE and ESD in general:

1) Gamification is an efficient process of attracting youth to and engaging in environmental and entrepreneurial education. However, its effect on retaining participants throughout the educational programme very much depends on how the gamification process is designed. More research and tests are needed to clarify this aspect.

2) The efficient interconnection of all gamification elements and the engaging game environment are essential for implementing the concept successfully. Every educator / trainer should know the whole gamification process and integrate it into each lecture / training.

3) Gamification is a good way to engage learners in collaborative practical education and volunteer activities. For that one needs to offer the players the freedom of choice of these activities and some way to reward them for accomplishing the tasks.

4) However, one should be very careful in using experience points, badges, and other rewards. They might stimulate proper actions and learning during the gamification experience, but might not affect the behaviour change after it in the right way (that is people will not perform any proper action until they receive some reward). The gamification designer should choose and apply the system of rewards very carefully based on the existing research in gamification and psychology of youth learning.

5) Finally, an efficient and powerful application of gamification in environmental and entrepreneurial education is much more than PBL (points, badges, and leaderboards)

(Werbach, Hunter, 2012). The gamification designer should complement them with other important elements, such as storyline, meaningful choices of activities, networking and collaboration tools, progression levels, and ultimate challenge and status. All of them should be logically and closely connected with each other and with the topic of environmental management and entrepreneurship.

Thus, in spite of positive effects of gamification on youth learning, there are a certain aspects that an educator needs to consider and apply carefully in order to minimize the possible negative consequences of gamification. However, how to do that is still a topic of much research and experiments. Therefore the project G.R.E.E.N. will continue further on. Moreover, it will be integrated with the on-line gamification platform, the Game with Impact, built by MEGA together with its partner Bright Games, to offer a more accessible environmental learning experience, as well as offer more precise data for further research.

#### **4 Conclusions and Recommendations**

The modern world faces challenging time nowadays. The pressure of Anthropocene with its harmful effects threatens the whole global environment, and as a consequence the global society as well. There is an urgent need for people's behaviour change towards more eco-friendly living, green entrepreneurship, and sustainable development. Education on the topics of environmental management, governance, and entrepreneurship is the key foundation to ensure this to happen.

However, the quality and efficiency of education and learning experience does not meet the demands and requirements of the modern technological and interconnected world. There is the need for environmental and entrepreneurial education that incorporates collaborative, social, practical, problem-based, and interdisciplinary learning. One of the ways to meet this need is to apply the concept of gamification in environmental education and learning.

Gamification is the approach of adapting game tools and elements to a non-game context, such as education and learning process. It is a powerful engagement and motivation tool for learners, as well as the provider of experiential, collaborative, and entertaining learning experience. Due to all that gamification is argued to be the learning instrument that ensures the longest retention of information and knowledge.

Nowadays there are many examples of applying gamification to environmental education and entrepreneurship. For this article we referred to the project G.R.E.E.N. organized by MEGA and Medium in Moldova as one of most recent case studies in this area. Our research and evaluation of the project showed that integrating gamification methods and tools in environmental and entrepreneurial education improves its attractiveness to learners and their engagement with it, stimulates practical volunteer activities and initiatives, generates interest in the topic, and unites participants for collaborative action and teamwork.

Still, gamification has its disadvantages that should be considered and mitigated by an educator. Care should be taken in applying rewards within the learning experience, as they may not result in the desired behavior change. Rewards and badges should be supplied with other gamification elements, such as storyline, progression levels with increasing difficulty, social tools, meaningful choices, and other. And all of them should be interconnected with each other and closely related to the learning topics.

All in all, gamification has great potential in meeting the current need for a more practical, collaborative, and engaging environmental and entrepreneurial education. There are still gaps in understanding certain aspects of it and how to use it efficiently. And therefore much more research and many more experiments and case studies of gamification are required.

## References

- Blumstein, D. T., Saylan, C. (2007), The Failure of Environmental Education (and How We Can Fix It). PLOS Biology, DOI: 10.1371/journal.pbio.0050120
- Charisma, J.J., Chua, J.H. & Sharma, P. (2003), Current trends and future directions in family business management studies: Toward a theory of the family firm. Coleman White Paper Series, www.usasbe.org
- Craig, J.B.L. and Johnson, D. (2006). Establishing individual differences related to opportunity alertness and innovation dependent on academic-career training. Journal of Management Development, 25(1): 28-39
- Deamer, I. and Earle, L. (2004). Searching for Entrepreneurship. Industrial and Commercial Training. 36 (3): 99-103
- Deterding, S., et al. (2011), Gamification: Toward a Definition. Gamification Research Network, CHI 2011, May 7 – 12, Vancouver, BC, Canada
- Foley, S. F., et al. (2013), The Palaeoanthropocene – The beginnings of anthropogenic environmental change. Anthropocene 3, 83-88
- Henry, C., Hill, F. and Leitch, C. (2005), Entrepreneurship education and Training: can entrepreneurship be taught? Part II. Education + Training 47 (3) : 158-169
- Iscenco, A. (2014), Gamification in Sustainable Development. Masterpieces of the Nature, March 6.
- Iscenco, A., Movila, M., Borodziuk, D. (2014), MEGA Game Book. Environmental Learning Games Compendium: First Edition. Moldovan Environmental Governance Academy, September 1
- Kuratko (2003), Entrepreneurship Education: Emerging trends and challenges for the 21st century. Coleman White Paper Series, www.usasbe.org.
- Kuratko, D. F., Ireland, R.D. & Hornsby, J.S. (2001), Improving firm performance through entrepreneurial actions: a cordia corporate entrepreneurship strategy. Academy of Management executive 15(4):60-71
- Mason (2011), Entrepreneurship Education and Research: Emerging Trends and Concerns. Journal of Global Entrepreneurship
- Peng, M. W. (2001), How entrepreneurs create wealth in transition economies. Academy of Management Executive 15(1): 95-110
- RecycleBank (2014), About Us [Online]. Available at: <https://www.recyclebank.com/about-us>
- Sandbrook, C., Adams, W. M., Monteferri, B. (2014), Digital Games and Biodiversity Conservation. Policy Perspective, Conservation Letters, 1-7
- Seelig, T. L. (2005). Entrepreneurship Education Around the World. Paper presented at REE USA 2005, Stanford University, Oct. 26. 2005
- Smith, G. A. (2000). Defusing Environmental Education: An evaluation of the critique of the environmental education movement. Center for Education Research, Analysis, and Innovation, April 25
- Townsend, J. (2003). The Trainer's Pocketbook. Management Pocketbooks, 10th edition
- UNESCO (2012). Shaping the Education of Tomorrow: 2012 Report on the UN Decade of Education for Sustainable Development Abridged
- Werbach, K., Hunter, D. (2012). For the Win: How Game Thinking Can Revolutionize Your Business. Wharton Digital Press, October 30