

Gamification in Non-Formal Adult Educational Practices

Olena SAMODUMSKA¹,

Inna ZARISHNIAK²,

Halyna TARASENKO³,

Svitlana BUCHATSKA⁴,

Iuliia BUDAS⁵,

Iryna TREGUBENKO⁶

¹ Classic Private University, Zaporozhye, Ukraine, samodumska@gmail.com, ORCID ID: <https://orcid.org/0000-0002-7884-8138>

² Vasyl Stus Donetsk National University, Donetsk, Ukraine, Izarishniak@donnu.edu.ua, ORCID ID: <https://orcid.org/0000-0002-0948-1352>

³ Public Higher Educational Establishment «Vinnytsia Academy of Continuing Education», Vinnytsia, Ukraine, tarasenkogal@gmail.com, ORCID ID: <https://orcid.org/0000-0001-9394-2600>

⁴ Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University, Vinnytsia, Ukraine, svitusik@gmail.com, ORCID ID: <https://orcid.org/0000-0001-6063-5858>

⁵ Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University, Vinnytsia, Ukraine, busyulya@bigmir.net, ORCID ID: <https://orcid.org/0000-0003-1029-9555>

⁶ Private Higher Educational Establishment "European University", Kiev, Ukraine, i.b.tregubenko@gmail.com, ORCID ID: <https://orcid.org/0000-0003-4991-5511>

Abstract: The presented article reveals and generalizes the experience of using gamification in the context of non-formal adult educational practices.

From this perspective, the basic understanding of gamification is defined, priorities are set for the use of gamification components, the non-game context as a basis for gamification of training course programs is analysed. An empirical study of extrapolated game mechanics in non-formal adult educational practices of Adult Education Centres has been carried out. Definitions are given regarding consideration of social and psychological types of adult students for application of gamification of non-formal education.

In the article the gamified educational non-game context is formulated as non-imitation with apreserved invariable content of educational activity at changing the way of organization of this activity.

Among the most common game mechanics found to meet the priority needs of adult students are those in which reward was offered for the task; balanced competition was stimulated; different types of interaction were envisaged; an opportunity was provided to share results and achievements outside of training; quick feedback was provided.

Variability of extrapolation of game mechanics into non-formal educational practices of adults concerns the following main didactic categories of educational programs: learning objectives; the forms of training organization; teaching methods; learning motivation; control of learning outcomes.

Keywords: *Non-formal adult education, adult education centres, application of gamification, non-game context, game components, game mechanics, game dynamics.*

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Introduction

One of the current trends in the development of non-formal adult education is its gamification. High-level competition forces non-formal education providers to compete for the attention, time, physical and financial capital of the target audience –the adults who are motivated to lifelong learning. A tool of such motivation to participate in non-formal educational activities or to master training courses, short-term or long-term, is creation of special constructs of gamification of the educational process.

The purpose of this article is to identify and summarize the experience of gamification in the context of non-formal educational practices of adults, to identify further potential for its development in Ukraine.

Review of current sources related to the application of gamification in non-formal educational practices was conducted in accordance with the stages of the study, taking into account the following important for us criteria: 1) compliance with the basic understanding of gamification; 2) the priority of the components of gamification for implementation in non-formal educational practices of adults; 3) structuring the non-game context as a basis for gamification of the curriculum; 4) variability of extrapolation of game mechanics into non-formal educational practices of adults; 5) definitions for taking into account the social and psychological types of adult students for application of gamification in non-formal education.

In this work we relied on recent publications of foreign researchers dedicated to a holistic analysis of the concept, structure, internal and external processes of gamification in general– Werbach & Hunter (2012). Especially important for us were the works, which in detail, in our opinion, revealed some issues of gamification in education. Let's name some. The basic nature of gamification in education is explained by Seaborn & Fels (2015). Literature on introduction of gamification in education was reviewed by Caponetto, Earp & Ott (2014); Dichev & Dicheva (2017). Problems and potential for application of gamification in education are revealed by Gerber (2014). Gamification is analysed as a way of organizing learning by Orlova & Tytova (2015). A classification of players was made, which in our opinion should be extrapolated for the effective implementation of gamification by Bartle (2003). Emphasis is placed on practical and empirically validated recommendations for the development of educational games by Linehan, Kirman, Lawson & Chan (2011), etc.

In our study, we also addressed some conclusions made by Nieto-Escamez & Roldán-Tapia (2020) based on the analysis of works on the use of gamification-based learning during isolation from the pandemic.

The issue of introducing gamification in education has become vital for Ukrainian researchers in the last decade. Thus, our study takes into account conclusions made by Tkachenko (2015) on the analysis of gamification of the formal and non-formal educational spaces. We are impressed by the holistic representation of the term “gamification” by Trishchuk, Fihol & Volyk (2019) through transcoding in the process of term formation. The authors point to the tendency to normalize the terminological apparatus of gamification in education in order to avoid unwanted confusion in future. We believe that understanding of gamification “as a technique for attraction, and game learning - as a technique that directly uses a game as a tool” (Serheieva, 2014, p. 13) is somewhat limited and needs a more substantial explanation. At the same time, the author emphasizes the shortcomings of gamification that we not only agree with, but also tried to explore in more detail in our work. This is especially true for “misunderstanding of goals and objectives and inability to implement game mechanics” (Serheieva, 2014, p. 8).

The first part of the article presents the results of a review of publications on theoretical aspects of gamification in education. Based on these studies, priority components of gamification for non-formal adult educational practices were identified. In the second part, based on the analysis of the most popular training programs of the courses provided by the Centres for Adult Education, conclusions are made about the non-game context as a basis for gamification of non-formal educational practices. The third part presents results of an empirical study of the use of game mechanics in non-formal adult educational practices selected for analysis.

Literature review

The history of gamification in educational processes is not new, but its conscious introduction into adult education became widespread at the beginning of the XXI century, when there was a demand of the adult population for lifelong learning (Tkachenko, 2015). This is especially true for non-formal adult education, which in Ukraine is usually carried out outside the official (formal) system and is not supported by a state diploma, while providing adults with personal, professional and socially significant results (Rasskazova, 2017; Samodumska, 2019; Demchenko, 2021; Prots, 2021;

Kosholap, 2021; Khatsaiuk, 2021; Ovcharuk, 2021; Nerubasska, Maksymchuk, 2020; Nerubasska, Palshkov, & Maksymchuk, 2020; Gerasymova, 2019).

The latter is confirmed by the results of the survey “Trends in the development of non-formal education in Ukraine” (2018) on the motives of non-formal adult learning: 74.2% of respondents indicated that they studied for personal development; 72.5% - to increase the level of education, expand the worldview; 67.9% - for professional development; 12.7% - to obtain a new profession (Moskalenko, 2018). According to Moskalenko (2018), among the purposes of non-formal education respondents 1.8 times more often selected personal development, improvement of education and expansion of their worldview than improvement of their professional skills and acquisition of a new profession. But due to the fact that more than 100 respondents acquired new professions due to their involvement in non-formal education, the author points to the significant potential of non-formal education as a source of change in the labour market and recommends updating this area of study (Moskalenko, 2018).

Such actualization, as indicated in the works of Rasskazova (2017) and Serheieva (2014) is contributed by introduction of gamification in the educational practices of adults.

In this article, we did not rely on publications devoted to the study of full-fledged games and their application in education. Since initially in the study, we used the recently accepted understanding of gamification as basic in non-formal adult education, based on the definition proposed by Werbach & Hunter (2012): “the use of game elements and game mechanics in a non-game context” (Werbach and Hunter, 2012, p. 31). Gamification in education, as in other non-game formats, in particular in business, helps to identify mechanisms that ensure involvement of “players” (Orlova & Tytova, 2015), in our case - adults who are motivated to learn throughout life. Later, it became more acceptable for us to use the definition by Caponetto, Earp & Ott (2014) of gamification in education as “introduction of elements of game design and game experience into the learning process” (Caponetto, Earp & Ott, 2014, p. 53), because such an understanding gave us grounds for a more detailed and clear determination of the components of gamification and criteria for its implementation.

We found an explanation of the basic nature of gamification in education in the work of Seaborn & Fels (2015), who conducted an interdisciplinary review of gamification in action, focusing on empirical findings related to the purpose and content, system design, approaches and

methods, and impact on the participant. At the same time, we agree with the authors' indication on the subjectivity of existing definitions, various or unspecified theoretical foundations, the discrepancy between empirical conclusions and inadequacy of experimental design. We consider significant the conceptual theoretical justification of the gamification of learning made by Gerber (2014), where the author points out that gamification in its sectoral conceptualization in education would not work at that time, unless it is specifically revised and rethought.

In our study, we turned to some conclusions made by Nieto-Escamez & Roldán-Tapia (2021), based on an analysis of works on the use of gamification-based learning during isolation from the pandemic with the help of searching the Scopus, PsycINFO, ERIC, and Semantic Scholar databases (Nieto-Escamez & MD Roldán-Tapia, 2021). In particular, it was important for us to conclude that gamification for students was an innovative, exciting and effective strategy for providing learning materials, some of which indicated provision of effective social support during isolation from the COVID-19 pandemic (Nieto-Escamez & Roldán-Tapia, 2021).

In the educational process, gamification differs from other game forms, according to Trishchuk, Fihol & Volyk (2019) "the focus of participants in the process on a real goal related to their own activities, not on the game for the sake of game..." (Trishchuk, Fihol & Volyk, 2019, p. 74). Accordingly, for the study we determined priority of the components of gamification depending on the sequence of their development for implementation in non-formal educational practices - non-game context, game components, game mechanics, game dynamics.

The non-game context was considered by us as the actual educational process for adults, and as a process of organizing the interaction of adults with the provider of non-formal educational practices at the stage of their inclusion in learning. To create a basis for the analysis of the non-game context, the information taken for processing included training topics, learning objectives, number and structure of modules, learning outcomes, certification.

The organizers of the non-formal educational space for adults are providers in various fields - state, religious, corporate and individual. Accordingly, organization and conduct of non-formal educational practices have different goals and objectives, differ in the number of people and communities covered, sites and forms of educational activities, the scale of

educational impact on formation of general and professional competencies in adults. Hence, we considered it reasonable to take into account in the study the analysis of literature sources on the types of game components, mechanics and dynamics and their impact on the motivation of adults to actively participate in the learning process organized by different providers.

To unify the terminology of gamification in relation to the non-formal educational space, we used the concepts indicated by Werbach & Hunter (2012), components, mechanics, dynamics. Dynamics is the highest level, which includes limitations, progress, emotions, stories, relationships. Mechanics is an order of rules that determines the result of interaction within the system, and dynamics - is the reaction of users to a set of these mechanics. Game mechanics provide actions. These include expectations of reward, competition, collaboration, challenges, chances, feedback, resource acquisition. The components are at the basic level of the gamification process and cover specific examples of mechanics and dynamics. These include: avatars, badges, collections, content unlock, gifts, leader boards, levels, scores, virtual items, etc. (Werbach & Hunter, 2012).

To denote game components in their study, Dichev & Dicheva (2017) use the term game elements and emphasize that “empirical research on understanding which elements of the game and under what circumstances can lead to the desired behaviour is not fully systematic ...” (Dichev & Dicheva, 2017). This argument allowed us to use *game components* as a working term. They are mostly, in their essence, related to the success of introduction of gamification in adult education programs.

The most commonly used combination of game components, as Nicholson (2015) points out, is a combination of points, badges, and leaders (PBLs) (Nicholson, 2015). One cannot but agree with this, because such a combination is the closest to the classical system of monitoring and evaluation of academic achievements in formal education as well.

Introduction of game components in non-formal educational practices takes place both online, within the frameworks of massive open online courses (MOOC), and as a result of modification of traditional non-formal educational practices for adults.

Providers of non-formal educational practices are most interested in *game mechanics* because of their ability to involve participants in the learning process and to motivate them to obtain learning outcomes. Accordingly, to understand the level of their impact in the educational context, we formed our decision on which categories of game mechanics should be included in

the structure for assessing the gamified activities of non-formal education providers.

The vast majority of literature sources reviewed have shown that gamification in education has received considerable attention because of its motivational potential. Researchers Linehan, Kirman, Lawson & Chan (2011) reveal how the relationship between motivation, which is one of the leading factors, and students' academic achievements is formed through their effort and time spent on learning (Linehan, Kirman, Lawson & Chan, 2011). Also popular among literature sources is the proposal to gamify education in order to establish relationships, actions and behaviours (Caponetto, Earp & Ott, 2014). Another interesting position for us was articulated by Codish & Ravid (2015) on introduction of game elements and mechanics to learning activities, which is based on attractiveness, playfulness and creating a field for immersing students in the learning process, just as it happens in games (Codish & Ravid, 2015).

Possibilities of assessing the individual psychological and functional impact of game elements in non-gaming contexts were studied by Liberot (2015). What is interesting for us is the distinction between "deep and superficial gamification" in terms of mechanics and framing and their psychological strength.

The purpose and direction of adult behaviour in learning is determined by motivation of varying depth. Not only are they motivated to learn in different ways, but their motivation varies depending on the situation, time, duration, context, efforts. That is why we started searching for options for extrapolation of player typologies to optimize gamification of non-formal adult educational space.

Taking into account the social and psychological types of adults who study is another specificity that should be considered in the process of gamification of non-formal educational practices for adults. At each stage of life under new circumstances adults develop self-awareness, cognitive, motivational spheres, undertake personal and professional changes. Non-formal gamified learning helps them to learn new general and exceptional information, acquire new skills and abilities for further practical application in new activities, improve personal and professional competencies in a mobile and effective way.

All these features of teaching different categories of adults are important and form the basis for selection and design of gamification scenarios. In the gaming world for a long time grouping of characters of

players of multiplayer games offered by Bartle (2003) remains actual. Similarly, in every educational situation, the essential personal qualities of adult students are manifested. The search for options for extrapolating the typologies of players to non-formal adult learning forced us to get acquainted in detail with the existing experience of applying this classification in gaming practice.

Trying to understand the motivation of players, Bartle (2003) identified two ranges: “action – interaction” and “players - the world”. He called the place of their intersection the plane of interests and on the basis of his own observations the researcher identified the following groups: Achievers, Killers, Explorers, Socializers. Bartle (2003) introduced “Explicit – Implicit” category in the extended version of the player type system, which positions players in the three-dimensional space and divides them into eight types, each named into two more, depending on whether the players are acting consciously or not. Regarding the latest extended typology, we agree with the justifications given in the article by Yee (2006): several components related to one type cannot be related to each other; player types can intersect with each other; the model cannot be used on a practical basis unless it is confirmed by empirical data.

The typology of players proposed by Bartle (2003) is a pattern of behaviour that we propose to partially extrapolate to the process of applying gamification in learning. But it should be understood that the way to determine the player type map is based on the Bartle test for multiplayer games. Most Ukrainian-language tests are translations of the author’s original test from English. To solve the problem, we plan to develop a special professional test, the results of which can be used by non-formal education providers in gamification processes. We predict that this stage will further create recommendations for optimizing scenarios for maintaining balance of the introduction of gamification in the non-formal educational practices, which should also be extrapolated according to the Bartle model - the main scenarios for maintaining balance in the game.

The final categorical apparatus of the theoretical information collected by us includes the following components: non-gaming context (learning topics, learning objectives, number and structure of modules, learning outcomes, certification), game components, game mechanics, game dynamics, typology of participants in the gamified learning process.

The non-gaming context in our study is the content of various adult educational practices in the non-formal educational space, which responds

with the maximum speed and sensitivity to requests of adults for opportunities to master modern personal and professional competencies, soft and hard skills.

The basis of modern non-formal adult education is the organized activities of providers, which maximally promotes such process in which adults can consciously develop as personalities and increase the level of knowledge and understanding. Within this open system, which continues to take shape, adults have free opportunities to develop skills and ways of self-expression and self-realization in personal and professional areas.

The non-formal Ukrainian educational space of adults is full of various areas, topics and technologies of adult learning, which are confirmed by catalogues and information publications, including a bibliographic index of Ukrainian publications on adult education, presented by Lukyanova in a specialized collection (Lukyanova, 2016).

At the same time, the infrastructure of contemporary non-formal adult education is significantly diversified:

- new types of non-formal educational institutions;
- availability of non-formal education providers of various forms of ownership and organizational forms of activity;
- variety of directions of educational programs;
- freedom to use new educational technologies, including gamification;
- spreading the impact on various spheres of adult life.

Such diversification allows for the diversity and variability of groups and categories of adult students, aims to optimize conditions of their learning and introduction of gamification.

The basis for analysis of the non-gaming context became the following information: topics of training programs, goals and objectives, number and structure of modules, learning outcomes, certification.

To assess the non-gaming context of gamified activities of non-formal education providers, we analysed the most popular training programs used by existing non-formal adult education providers in Ukraine - Adult Education Centres (hereinafter the Centres). Information about providers can be found on Ukrainian sites for non-formal education: Portals “Public Space”, “Public Initiatives of Ukraine”, “Online Platforms for Non-Formal Education in Ukraine”, “Resource Centre“Group”, Public Association “Ukrainian Association for Adult Education”, Ukrainian Forum of

Philanthropists, “Opportunity Digest on StudWay”, “Big Idea: Opportunities”, “Openstudy”, “Platform”, “Opportunities in Ukraine”, etc.

Adult education centres represented on these resources, mostly have their own websites or accounts, are individuals or legal entities of various forms of ownership and legal forms that provide educational services for non-formal education to various categories of adults, operate independently or as a structural unit of educational, cultural, other organizations (institutions, establishments) or enterprises, and are centres of social integration of adults. As providers of non-formal education, the Centres are distinguished by the fact that they carry out activities aimed not only at organizing but also at providing and implementing the direct process of adult teaching (Samodumska, 2019).

We analysed randomly selected 53 online educational programs of 11 centres of adult education in Ukraine - Bila Tserkva, Vinnytsia, Kyiv, Korostyshiv, Lviv, Melitopol, Mykolaiv, Odesa, Sumy, Kharkiv. The centres are individuals or legal entities of private ownership or public organizations. They have arbitrary names of Open Educational Spaces, Clubs, Education Factories, Hubs, Centres, Schools of Adult Education.

The most popular programs in demand among the adult population are programs in the following areas: valueological education; family education; educational tourism; leisure education; financial education; civil education; historical and artistic education of adults in museums, libraries, art galleries, exhibitions, etc.

To analyse the non-gaming context, we identified the topics of the programs in accordance with the general (key) competencies (generic competencies, transferable skills) to which they are aimed. In the study, we did not take into account programs aimed at development of subject-specific (professional) competencies. Since they depend on the subject / professional / special field / industry and determine the profile, specifics and qualifications in general. General competencies have a universal character, not tied to the subject-special or professional sphere.

Methodology

We have summarized the topics of the analysed programs into the following groups: cognitive-personal, linguistic, socio-civic, basic-technological, information-digital, entrepreneurial, general cultural, health-preserving.

An important component of the non-gaming context is the set goals, which provide for acquisition of certain general competencies, and are not limited to the gaming ones: to get points, to complete gaming tasks, going through quests, etc.

The gamified educational non-gaming context is formulated by us as the one that has a non-imitative character with a preserved unchanged content of educational activity when changing the way of organizing this activity.

Any of the gamified training programs of educational courses selected for analysis is not a game, although the online formats of some of them are similar to a game due to a game shell, when software supporting the course is developed for them. Moving through the modules of the program, an adult student performs educational and game tasks. For example, an educational task is to master different styles of oratory; a game task is to score 30 points for completed written tasks within a certain limited period of time to move to the next level. Moreover, educational goals always remain a priority, and game goals are designed only to help maintain intrinsic motivation to perform educational tasks.

A non-gaming context for the use of gamification often serves any complex and quite routine area for learning, the activities in which cause a certain distrust of their own strength and reduced motivation in an adult student. Gamification is designed to increase motivation for learning activities and promote commitment to perform tasks, which increases the likelihood of achieving the educational goal. At the same time, the adult students remain in their reality, “keep their character”, which allows them to acquire the very competencies they need. Gamification creates certain conditions for achieving educational tasks, in contrast to games, when a special game reality is modelled with its internal laws (role-playing games, business games, organizational-activity games, etc.), when adult students accept the role according to which they act and make decisions.

Results and discussions

Thus, the non-gaming context in the process of gamification remains unchanged, but structured in a special way, which increases motivation to achieve the learning goals and objectives, as well as increases the time of commitment to achieve them. We came to the conclusion that gamification, in the narrow sense, to the actual non-gaming context, is used to qualitatively improve implementation of educational processes: 1) improving

the involvement of adult students; 2) strengthening the motivation to work towards the learning outcome; 3) development of competencies related to team building; 4) networking for each adult student; 5) improving the quality of knowledge and acquisition of competencies relevant to the topics of the curriculum.

The expected result of the use of gamification in non-formal educational practices is a change in the usual behaviour of the adult audience and its more active involvement in educational activities, which requires additional research. The gamification procedure itself consists of a set of measures with the use of game components, mechanics, dynamics, which can be used in full scope, but mostly used in part.

The information, the analysis of which we have presented below in the tables, is collected by us as follows. From the 53 educational programs offered by the Centres for Adult Education in Ukraine, we selected 15 in which game mechanics are used to increase motivation to learn through ways to apply bonuses / mega bonuses for academic achievement, receiving / not receiving rewards for performing / non-performing simple organizational actions, application individual or group forms of activity, procedures with terms and sequence of disclosure of educational content, etc. In order to identify and unify the game mechanics themselves with their names for use in other industries, we have preserved their short apt names.

The 15 programs of non-formal educational practices analysed by us were grouped in 5 directions: valeological education (direction 1); financial education (direction 2); leisure education (direction 3); family education (direction 4); historical and artistic education of adults in museums, libraries, art galleries, exhibitions (direction 5).

The results of the analysis showed that the most common game mechanics were those in which: 1) a reward for completing a task was offered - points, badges, other “goodies”, which were mostly of an intangible value; 2) competition was stimulated in a balanced way, because it does not motivate all adults, and not involved mechanics, in which comparisons with others or a low position in the ranking could demotivate; 3) different types of interaction were provided; 4) an opportunity was provided to share results and achievements outside of training (for example, in social networks); 5) quick feedback was provided on correct and incorrect actions.

The results of the analysis revealed that the 12 common game mechanics singled out by us are used in all areas of non-formal adult

education (Table 1). The most popular in these programs were the game mechanics –“Achievements”, “Conditional Terms or Appointment Dynamics”, “Multilevel or Controlled Information”, “Community Collaboration” (all 86.7%). Another game mechanics is more or less popular in selected areas –“Chain Schedules” (46.7%).

Table 1. *Collective results of quantitative analysis of the non-formal adult education programs*

Name	n	y %
“Achievements”	13	86.7%
“Appointment Dynamics”	13	86.7%
“Avoidance”	4	26.7%
“Increasing value or status”	3	20.0%
“Chain Schedules”	7	46.7%
“Random Event”	3	20.0%
“Behavioural Momentum”	3	20.0%
“Free Lunch”	3	20.0%
“Multilevel or controlled information”	13	86.7%
“Community Collaboration”	13	86.7%
“Discovery”	3	20.0%
“Modifiers”	4	26.7%

A cross-table was also constructed, which shows the quantitative indicators of the use of selected game mechanics in each of the areas of non-formal adult educational practices (Table 2).

Table 2. *Cross-table*

Game Mechanics Name	Area1	Area2	Area3	Area4	Area5	Σ
“Achievement”	3	2	4	2	2	13
“Appointment Dynamics”	3	1	4	1	4	13
“Avoidance”	2		1	1		4
“Increasing value or status”	1	2				3
“Chain Schedules”	1	3	1	2		7
“Random Event”	1	1			1	3
“Behavioural Momentum”			2	1		3
“Free Lunch”	1	2				3
“Multilevel or controlled information”	2	5	3	2	1	13
“Community Collaboration”	3	4	1	2	3	13
“Discovery”	1	1			1	3
“Modifiers”	2		1		1	4
Σ	20	21	17	11	13	82

As can be seen from Table 2, in the presented sample game mechanics are the most frequently used in the financial and valeological areas of non-formal educational practices, respectively 21 and 20 times.

Consistent with data in Table 2, Pearson's coefficient of agreement was calculated - the correlation coefficient according to the nominative data (Cohen, 1960).

Calculation of the coefficient of agreement was carried out according to the formula:

$$P = \sqrt{\frac{Q^2}{1+Q^2}},$$

Where $Q^2 = \frac{\sum_j \sum_i k_{ij}^2}{\sum_j k_{ij} \sum_i k_{ij}}$ (k_{ij} - data in Table 2).

The obtained result $P = 0.55$ proves that there is a midrange connection between the areas of non-formal adult education and game mechanics. Thus, the obtained value of the Pearson's coefficient of agreement indicates sufficient consistency between the selected game mechanics in one direction or another of non-formal educational practices. We believe that at the present stage we should look for more logical associations and combinations for the application of various game mechanics for various areas of non-formal adult education, which can lead to the desired results of gamification and affect the actual learning outcomes of adult students.

The existing extrapolation of game mechanics into informal educational practices of adults determines the dynamics of various didactic processes and stages: from achieving goal to the nature of interaction between participants of the educational process. Conceptually, the experience of using the analysed game mechanics concerns the following main didactic categories:

1) learning objectives: through directed challenges to victory, providing opportunities as components of luck and happiness, descriptions of winning situations, receiving awards, gaining resources, opportunities for progression, victory, etc.;

2) forms of organization of education: through cooperation of adult students in pairs, small and large groups, the implementation of agreements with other participants, belonging to the community;

3) teaching methods, i.e., ways of organizing educational and cognitive actions of adult students: determining the sequence of actions,

organizing the competition, receiving step-by-step feedback (visible immediate result of the performed learning activities “here and now”);

4) motivation for learning: emotional impact, development of events in accordance with a single logic or history, use of mutual assistance schemes, involvement and loyalty, the impact of the possibility of “useful” entertainment and fun, etc.;

5) control of learning outcomes.

Conclusion

Analysis of the existing generalized experience of application of gamification concerning informal educational practices of adults has allowed to state its active development in this sector as a whole.

Based on research on the theoretical aspects of gamification in education, the priority components of gamification for non-formal adult educational practices are as follows: non-gaming context (learning topics, learning objectives, number and structure of modules, learning outcomes, and certification), game components, game mechanics, game dynamics, typology of participants of the gamified educational process.

The conclusions made about the non-gaming context as a basis for gamification of non-formal educational practices allowed us to formulate the “gamified educational non-gaming context” as one that has a non-imitative character with the preserved intact content of educational activities when changing the method of organizing this activity.

The non-gaming context in the process of gamification remains unchanged, but in a specially structured way, which increases the motivation to solve the learning goal and objectives, as well as increases the time of commitment to achieve them. Gamification, in the narrow sense, to the actual non-gaming context, is used to improve the involvement of adult students, increase motivation to work for learning outcomes, development of competencies related to group interaction (team building), building a social network by each adult student (networking); improving the quality of knowledge and acquiring the competencies relevant to the subject curricula.

On the positive side of the implemented game mechanics we have analysed, one should note that they are built in such a way that adult students, firstly, have a choice, secondly, join them on a voluntary basis, and thirdly, are focused on the needs of adult learners they seek to achieve. Among the latter: the need for autonomy - independent choice of modules and scope of training, methods of achieving success; the need to implement

competencies - to understand, achieve, win; the need for recognition - to share the results, get feedback. To meet these needs, the most common game mechanics were those in which: 1) offered a reward for the task, which was mostly intangible value; 2) competition was stimulated in a balanced way; 3) different types of interaction were provided; 4) was given the opportunity to share results and achievements; 5) provided quick feedback on the right and wrong actions.

The variability of extrapolation of game mechanics into non-formal educational practices of adults concerns the following main didactic categories of educational programs: learning objectives; forms of training organization; teaching methods; learning motivation; control of learning outcomes.

For development of gamification, i.e., inclusion of a defined by us combination of non-game context, game mechanics, dynamics, components in educational activities, more systematic empirical research is needed to understand which combinations and under what circumstances can lead to the desired results of this gamification and influence on the actual results of educational activities of adult students.

Since understanding of gamification in education as introduction of elements of game design and game experience in the learning process is basic, we consider it appropriate to organize further research in close cooperation with universal specialists who are equally competent in education, game design, gamification practice, psychology. Further development of gamification of non-formal educational practices largely depends on the interests and capabilities of providers of such practices in Ukraine.

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References

- Bartle, R. (2003). *Designing Virtual World*. New Riders Publishing.
https://www.researchgate.net/publication/200025892_Designing_Virtual_Worlds.
- Caponetto, I., Earp, J. & Ott, M. (2014). Gamification and education: a literature review. In *8th European Conference on Games Based Learning*, (pp.50–57). Germany: ECGBL.
https://www.researchgate.net/publication/266515512_Gamification_and_Education_a_Literature_Review.
- Codish, D. & Ravid, G. (2015). Detecting playfulness in educational gamification through behavior patterns. *IBM Journal of Research and Development*, 59(6), 1–14. <https://dl.acm.org/doi/10.1147/JRD.2015.2459651>.
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20(1), 37–46.
<https://doi.org/10.1177/001316446002000104>.
- Demchenko, I., Maksymchuk, B., Bilan, V., Maksymchuk, I., & Kalynovska, I. (2021). Training Future Physical Education Teachers for Professional Activities under the Conditions of Inclusive Education. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(3), 191-213.
<https://doi.org/10.18662/brain/12.3/227>
- Dichev, C. & Dicheva, D. (2017). Gamifying education: what is known, what is believed and what remains uncertain: a critical review. *International Journal of Educational Technology in Higher Education*, 14, 9.
<https://doi.org/10.1186/s41239-017-0042-5>.
- Gerasymova, I., Maksymchuk, B., Bilozerova, M., Chernetska, Yu., Matviichuk, T., Solovyov, V., & Maksymchuk, I. (2019). Forming professional mobility in future agricultural specialists: the sociohistorical context. *Revista Romaneasca pentru Educatie Multidimensionala*, 11(4), 345-361.
<http://lumenpublishing.com/journals/index.php/rrem/article/view/1604/pdf>
- Gerber, H. (2014). Problems and Possibilities of Gamifying Learning: A Conceptual Review. *Internet Learning Journal*, 3(2), Article 5.
https://www.academia.edu/10301673/Problems_and_Possibilities_in_Gamifying_Learning_A_Conceptual_Review.
- Khatsaiuk O., Medvid, M., Maksymchuk, B., Kurok, O., Dziuba, P., Tyurina, V., Chervonyi, P., Yevdokimova, O., Levko, M., Demchenko, I., Maliar, N., Maliar, E., & Maksymchuk, I. (2021). Preparing Future Officers for Performing Assigned Tasks through Special Physical Training. *Revista Romaneasca Pentru Educatie Multidimensionala*, 13(2), 457-475.
<https://doi.org/10.18662/rrem/13.2/431>

- Kosholap, A., Maksymchuk, B., Branitska, T., Martynets, L., Boichenko, A., Stoliarenko, O., Matsuk, L., Surovov, O., Stoliarenko, O., & Maksymchuk, I. (2021). Neuropsychological Bases of Self-Improvement of Own Physical Health of Future Teachers in the Course of University Education. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(3), 171-190. <https://doi.org/10.18662/brain/12.3/226>
- Liberot, A. (2015). Shallow gamification is the psychological effects of presenting an activity as a game. *Games and Culture*, 10(3), 249-268. <https://doi.org/10.1177/1555412014559978>.
- Linehan, C., Kirman, B., Lawson, S. & Chan, G. (2011). Practical, appropriate, empirically-validated guidelines for designing educational games. *Proceedings of the International Conference on Human Factors in Computing Systems: May 7-12, 2011*. Vancouver. https://www.researchgate.net/publication/221515345_Practical_appropriate_empirically-validated_guidelines_for_designing_educational_games.
- Lukianova, L. B. (2016). *Osvita doroslykh: bibliografichnyi pokazhchyk: naukove vydannia* [Adult education: bibliographic index: scientific publication]. Kyiv: DKS-Tsentr. <https://lib.iitta.gov.ua/705654/1/%D0%BF%D0%BE%D0%BA%D0%B0%D0%B6%D1%87%D0%B8%D0%BA.pdf>.
- Moskalenko, L. (2018). Neformalna osvita v Ukraini: vymir mozhlyvosti (za rezultaty sotsiologichnoho doslidzhennia). [Non-formal education in Ukraine: measuring opportunities (according to the results of a sociological study)]. *Bulletin of Lviv University. Sociological series*, 12, 180-187. <http://publications.lnu.edu.ua/bulletins/index.php/sociology/article/view/10826/10971>.
- Nerubasska, A., Maksymchuk, B. (2020). The Demarkation of Creativity, Talent and Genius in Humans: a Systemic Aspect. *Postmodern Openings*, 11(2), 240-255. <https://www.lumenpublishing.com/journals/index.php/po/article/view/2625>
- Nerubasska, A., Palshkov, K., & Maksymchuk, B. (2020). A Systemic Philosophical Analysis of the Contemporary Society and the Human: New Potential. *Postmodern Openings*, 11(4), 275-292. <https://doi.org/10.18662/po/11.4/235>
- Nicholson, S. (2015). A RECIPE for meaningful gamification. In I. Wood, & T. Reiners (Eds.), *Gamification in education and business* (pp. 1-20). New York: Springer. <https://scottnicholson.com/pubs/recipepreprint.pdf>.
- Nieto-Escamez, F.A. & Roldán-Tapia, M. D. (2020). Gamification as online teaching strategy during COVID-19: A mini-review. *Frontiers in psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.648552>.

- Orlova, O. & Tytova, V. (2015). Heimyfykatsyia kak sposob orhanyzatsyy obuchenyia. [Gamification as a way of organizing training]. *TSPU Bulletin*, 9(162), 60-64. <https://cyberleninka.ru/article/n/geymifikatsiya-kak-sposob-organizatsii-obucheniya>.
- Ovcharuk, V., Maksymchuk, B., Ovcharuk, V., Khomenko, O., Khomenko, S., Yevtushenko, Y., Rybalko, P., Pustovit, H., Myronenko, N., Syvokhop, Y., Sheian, M., Matviichuk, T., Solovyov, V., & Maksymchuk, I. (2021). Forming Competency in Health Promotion in Technical Specialists Using Physical Education. *Revista Romaneasca Pentru Educatie Multidimensionala*, 13(3), 01-19. <https://lumenpublishing.com/journals/index.php/rrem/article/view/2662>
- Prots, R., Yakovliv, V., Medynskiy, S., Kharchenko, R., Hryb, T., Klymenchenko, T., Ihnatenko, S., Buzhyina, I., & Maksymchuk, B. (2021). Psychophysical Training of Young People for Homeland Defence Using means of Physical Culture and Sports. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(3), 149-171. <https://doi.org/10.18662/brain/12.3/225>
- Rasskazova, O. L. (2017). Neformalna osvita doroslykh: vyklyky i superechnosti [Non-formal adult education: challenges and contradictions]. *Osvita doroslykh: teoriia, dosvid, perspektyvy*, 1(13), 64–73. <http://www.adult-education-journal.com.ua/index.php/aej/issue/view/13>.
- Samodumska, O. L. (2019). *Suchasna neformalna osvita doroslykh v Ukraini* [Modern non-formal adult education in Ukraine]. Teória a prax edukácie dospelých: Andragogické vedecké študie. 83–89. Prešov. <https://www.pulib.sk/web/pdf/web/viewer.html?file=/web/kniznica/elpub/dokument/Mayer2/subor/9788055522180.pdf>.
- Samodumska, O. L. (2019). Systematyzatsiia tsentriv osvity doroslykh yak provaideryiv neformalnoho navchannia v Ukraini [Systematization of adult education centers as providers of non-formal learning in Ukraine]. *Science Rise: Pedagogical Education*, 4(31), 36–40. http://journals.uran.ua/sr_edu/issue/view/10623.
- Seaborn, K. & Fels, D. I. (2015). Gamification in theory and action: review. *International Journal of Human Computer Research*, 74, 14-31. <https://doi.org/10.1016/j.ijhcs.2014.09.006>.
- Serheieva, L. (2014). Heimifikatsiia: ihrovi mekhaniky u motyvatsii personal [Gamification: game mechanics in staff motivation]. *Teoriia ta metodyka upravlinnia osvitoiu*, 2(14). http://umo.edu.ua/images/content/nashi_vydanya/metod_upr_osvit/v_15/14.pdf.
- Tkachenko, O. (2015). Heimifikatsiia osvity: formalnyi i neformalnyi prostir [Gamification of education: formal and informal space]. *Aktualni pytannia humanitarnykh nauk*, 11, 303–310. <http://dspu.edu.ua/hsci/archive/>.

- Trishchuk, O., Fihol, N. & Volyk, N. (2019). Heimifikatsiia v osvitnomu protsesi [Gamification in the educational process]. *Tekhnolohiia i tekhnikadrukarstva*, 3(65), 72-79. <http://ttdruk.vpi.kpi.ua/issue/view/12217>.
- Werbach, K. & Hunter, D. (2012). *For the win: how game thinking can revolutionize your business*. Philadelphia: Wharton Digital Press.
<https://picture.iczhiku.com/resource/paper/shkSGKokAIOeIcNc.pdf>.
- Yee, N. (2006). Motivations for Play in Online Games. *Cyber Psychology & Behavior*, 9, 772-775. <http://dx.doi.org/10.1089/cpb.2006.9.772>.