Gamification in the training of future culture and art professionals: experience of EU countries

La gamificación en la formación de los futuros profesionales de la cultura y el arte: la experiencia de los países de la UE

Volodymyr Prusak[1a], Chepalov Oleksandr[2], Zabora Volodymyr[3], Seitablaiev Akhtem[4], Goryansky Volodymyr[5]

Ukrainian National Forestry University, Ukraine[1]
Kyiv National University of Culture and Arts, Ukraine[2345]

ORCID ID: https://orcid.org/0000-0002-1070-7830[1]
ORCID ID: https://orcid.org/0000-0002-2033-357X[2]
ORCID ID: https://orcid.org/0000-0001-6273-5430[3]
ORCID ID: https://orcid.org/0000-0002-7547-9824[4]
ORCID ID: https://orcid.org/0000-0003-1403-0190[5]

Resumen

En las últimas décadas, el número de estudios científicos sobre la gamificación educativa ha aumentado considerablemente. Por ello, el estudio ha establecido la naturaleza ambivalente de la gamificación como una influencia dual en las características del proceso educativo. Se ha utilizado métodos científicos generales (análisis, síntesis, inducción, deducción, etc.) para establecer la eficacia de la gamificación en el proceso educativo en el ámbito de la cultura y el arte. El objetivo del estudio es establecer las bases fundamentales del funcionamiento de las prácticas de juego en el marco del aprendizaje. El tema del estudio hoy sigue siendo relevante ya que se correlaciona con los problemas de digitalización de la esfera educativa en el contexto del desarrollo tecnológico y las condiciones de cuarentena. La conclusión proporciona una justificación para la posición de perspectiva de nuevas formas de conducir el proceso educativo en condiciones de emergencia o preferencias personales de sus participantes. La importancia práctica de este estudio radica en la posibilidad de analizar la experiencia de los países europeos sobre la implicación de la gamificación en el proceso educativo y la búsqueda de vías de mejora.

Palabras clave: Gamificación, motivación, compromiso, productividad, movilidad.

Abstract

In recent decades, the number of scientific studies of educational gamification has increased dramatically. The study has established the ambivalent nature of gamification as a dual influence on the features of the educational process. The work used theoretical general scientific

[a]Corresponding author:
E.mail: iakozymenko@ukr.net

methods (analysis, synthesis, induction, deduction, etc.) to establish the effectiveness of gamification in the educational process in the field of culture and art. The study aims to establish the fundamental principles of game practices functioning in the framework of learning. The topic of the study today remains relevant because it correlates with the issues of digitalization of the educational sphere in the context of technological development and quarantine conditions. In the conclusion, the justification of the position on the prospects of new ways of conducting the educational process in emergency conditions or the personal preferences of its participants. The practical significance of this study lies in the possibility of analyzing the experience of European countries in the involvement of gamification in the educational process and finding ways for further improvement.

Keywords: Gamification, motivation, engagement, productivity, mobility.

Introduction

Modern research often demonstrates the advantages and prospects of incorporating gamification into the educational process. In training future professionals, it plays an important role as a powerful motivating factor that promotes students' involvement in learning. However, in parallel with the spectrum of positive effects of gamification, there are a number of points that allow us to speak about the contradictory nature of game elements' involvement in non-game forms of teaching. They contribute to the formation of false goals and awareness of play as a key aspect of the activity.

International research in part uses interdisciplinary approaches to analyze gamification, allowing the combination of the acquisition of different disciplines to form an overall view of the process. Gamification is a kind of "educational tool" (Aguiar-Castillo et al., 2021), it is a practical approach that incorporates game elements and game experiences into the learning process (Metwally et al., 2021). In the current academic literature, there is a rapidly developing interest in innovation in educational environments where gamification processes occupy an important place. The application of their parts provokes research enthusiasm to maximize learning outcomes. Research developments in this direction tend to emphasize the need to maintain a balance between traditional constructive educational practices and modernized invasions. Gamification can greatly enhance learning, but it is short game interventions that can have a positive effect (Bai et al., 2020).

Gamification in artistic practices is an opportunity to implement certain cultural models through game forms, simulation of situational scenarios, and finding ways to resolve a certain conflict underlying the game. Thus, gamification can have a positive impact on students' motivation and their involvement in the educational process. Creating a prototype of a certain

environment in an educational context promotes immersion in a situational simulation, which allows forming a professional model of future specialists' behavior (Donnermann et al, 2021).

The use of learning games has its own specifics for the sphere of culture and art, but this practice seems to be an effective approach, which gives a positive impact on learning outcomes. The main advantages of this approach are increasing students' motivation, interest, productivity, and actualization of active interaction because the communicative function of gamification turns out to be extremely important in the context of students' cultural socialization. Besides all the above, gamification has a positive effect on the assimilation of acquired knowledge, the formation of skills and abilities, and this effect does not depend significantly on age or gender peculiarities (Putz et al., 2020).

Consequently, the work aims to establish the main principles of gamification functioning within the educational process in the field of culture and art, as well as their detailed analysis. It involves the formulation of positive and negative aspects of gamification of learning on the example of European countries, identifying the potential for effective use in the context of training future professionals in the field of culture and art.

Methodology

This study is theoretically descriptive. To implement it, a number of general scientific and specific research methods were used, in particular, elementary-theoretical analysis and synthesis (to form an idea of cause-and-effect relations of gamification methods use in the educational process and to identify general patterns), structural-analytical (to establish characteristic figures of gamification elements), induction and deduction (to formulate conclusions about general and specific circumstances of game elements use in the educational process), comparative (to cp. A comprehensive approach to the formation of an idea of gamification integration in the educational process allows to analyze the data from different scientific branches, including pedagogy, psychology, sociology, etc., and to draw conclusions based on the data obtained.

The study was carried out in three key stages: 1. The first was a selection of scientific literature, analysis of existing concepts, and country experiences in the study of gamification in the educational process. These studies use a methodology based on the analysis of gamification involvement experience in the educational process and critical synthesis of the dominant scientific concepts. They apply a systematic approach to form a structured view of the essence of gamification and its functionality, accordingly, classifying scientific developments according to their results (Metwally et al., 2021).

2. The second stage was the formulation of the concept of future research, the assumption of perspective, and the relevance of the topic of work, goals, and potential research objectives. The results of case studies using empirical methods (interviewing, surveying, questionnaires) provide a better picture of the overall effectiveness of gamification in European countries. These works use a process of consistent data collection and a qualitative approach to interpretation. Accordingly, such studies use similar methods of deduction and induction. They allow to formulate a concept of practical gamification based on a comparative analysis of data (Edwards & I'Anson, 2022).

3. At the third, final stage, a logical and coherent presentation of the material was carried out, results were summarized, and a reflection of the research results was carried out. It provides for the formation of evaluation conclusions about the effectiveness of gamification of the educational process, forecasts on its effectiveness, and prospects for use in the future. The prognostic component is present in many studies on the subject because it correlates with the gamification's aim to involve the subjects more actively in the educational process (Bieszk-Stolorz et al., 2021).

In the context of thematic specificity, the emphasis was placed on the peculiarities of gamification in modern conditions, involving a combination of traditional approaches and teaching methods with innovative techniques and methods. In the sphere of culture and art, where the prevailing role belongs to creativity, the game component is an important addition to the learning environment.

Results

The inclusive nature of gamification has been repeatedly confirmed by global cross-cultural studies. They note that the game element stimulates students' active participation in the educational process (Xu et al., 2022). This can be achieved in the conditions of interactive interaction of activity subjects. Game concepts aim at mastering knowledge by means of practical application in the generated circumstances.

For the other hand, the stimulus for students' participation in such activities can be the desire to win (if it is a competitive game aimed at revealing leadership qualities or realization of a creative idea, etc.), getting a reward (in the form of encouragement, recognition, or a materialized prize), taking part (for socialization and improvement of communicative abilities), etc. Different types of games form their different target orientation. Conventionally, all gamification formats can be divided into three main directions: theoretically oriented, practical, and creative.

Table 1
Basic principles of gamification

Types of gamification	Features
Theoretical	- contributes to mastering the theoretical component of the course is of a test or quiz nature - effectiveness depends on the quantitative elements of reward - the informative component plays a relevant role
Practical	- allows you to learn practical skills - the main condition is the regularity of performance - effectiveness is confirmed by the performance of the task in accordance with the established requirements
Creative	- the result is a new artistic object - requires the involvement of a set of necessary knowledge, skills, and abilities - encourages the generation of new ideas based on the experience gained

The first group is aimed at mastering knowledge, fixing it. Austrian researchers have found that gamification has a positive effect on knowledge retention and assimilation (Putz et al., 2020), which makes it easier to master theoretical cultural, and artistic disciplines. Such games are used in teaching professional disciplines of theoretical content in theater, music, choreography, architecture, sculpture, different types of visual arts, etc. Classes using gamification methods in these disciplines are adaptive in nature, focusing on students' needs, according to what they need to remember. If the need lies in mastering certain skills and habits, such game lessons belong to the group of practical lessons which allow mastering necessary algorithms or developing new activity models in conditions of realizing certain actions.

A key feature is the diagnostic-corrective function of the practical game process. Correction of errors, inaccuracies, teacher's advice, etc. contributes to the formation of student experience with the possibilities of its further application in professional activity. Practical gamification is often found in the educational process of stage training areas of future specialists: choreography, vocal, theater, etc. The last category is creative gamification, which is also focused on mastering the necessary skills, but its result should be a new artistic object.

It is aimed at the development of students' self-organization and orientation on his/her own creative activity.

In the context of this issue, the motivational aspect of gamification in the educational process remains important, which is clearly demonstrated by Belgian researchers (van Roy & Zaman, 2018). Drawing on the domestic experience of gamification, they conducted a survey, according to which the need for the implementation of the game component in the educational process through the awareness of its motivational effect in the long-term use was substantiated. They noticed that in the traditional system of education autonomous and controlled motivation in the usual conditions was linear in nature, showing initially a downward trend. However, the use of game elements allowed to change the trend towards an increase in autonomous motivation with the preservation of controlled linearity.

The motivational factor of the gamification perspective correlates with its hedonic aspect. Gaining enjoyment from the gameplay process arouses students' enthusiasm, provoking an interest in knowledge assimilation. Gamification mitigates the influence of exogenous motivational variables and increases the influence of endogenous ones, which directly affects the behavioral intentions of future professionals (Treiblmaier& Putz, 2020). However, at the same time, some studies refute the thesis about the effectiveness of gamification for the effects of engagement and satisfaction of the educational process using game elements. In particular, they emphasize the inhibition of expectations of gamification performance and low satisfaction with activities (Hammedi et al., 2021). This can be explained by conservative ideas about the essence of gameplay.

The game as a hedonistic way of realization of life practices in an imaginary, interactive format is perceived with a certain bias (Salemink et al., 2022). But even as a form of children's entertainment games has their own functionality. First of all, they are aimed at knowledge of the world in its various manifestations, secondly, they require compliance with regulated rules and attitudes, and, finally, contribute to the assumption of social roles prescribed in the game format. In the context of higher education in culture and art, gamification retains the same functions but in a specialized way. Narrowing the direction of the game context takes place the formation of the future specialist's personality.

Along with the positive effects of game elements for learning, researchers sometimes emphasize other negative aspects. In particular, an adversarial aspect of gamification is described. The effectiveness of this process can be assessed by quantitative and qualitative indicators: points, grades, etc. The creation of student achievement ratings, which are often used in modern education, is aimed at competitive struggle. Taking into account the powerful

emotional component of this approach, which consists of an intensification of striving for competition, getting approval and recognition through a rise in the rating positions, it manifests itself in demonstration of a competitive model based not only on economic factors but also on social and cultural ones. The future professional activity of specialists in various fields of art is focused on the realization of creative potential through constant practice and self-improvement. Consequently, technical skill, experience, and a number of other factors affect the receipt of advantages in future work. Therefore, the competitive element in the gamification process plays a preparatory role in the realities of professional activity.

The effectiveness of the inclusion of game elements in training is due to the promotion of interactivity, regularity through increased interaction between teachers and students, reducing breaks in classes, increasing the number of tasks, the solution of which requires mastery of the necessary skills, which contributes to high achievements in the development of creative abilities. The intensive inclusiveness of the student in the educational process is due to active technological development. The use of smartphones, laptops, and other portable devices has led to easier access to learning materials and created opportunities to attend classes from almost anywhere (Aguiar-Castillo et al., 2021). However, the level of development of modern digitalization requires high standards for game content in education. It is not only a question of technical functionality (respectively high sound and video quality, etc.), but also of accessibility and understandability of the interface, attractive design, and logical actions within the work with the application. Technical compatibility with different software, adaptability to different platforms, availability of iOS, Mac, Android, Windows, etc., plays an important role. The portability of gamification elements is an additional advantage for students in the possibility to combine access to educational platforms and materials with other tasks, minimizing penalties.

Particular attention should be paid to the design of educational game content. It should remain concise, conform to academic style, and fulfill primarily an educational and cognitive function. However, its design should take into account positive and negative reactions. The correlation of the cognitive and affective components of consciousness leads to increased performance of the educational process and affects the quality of learning (Mullins & Sabherwal, 2018). At the same time, an important consideration in the development of mass-produced digital industry products is the localization of game content. Cultural peculiarities of a certain region sometimes require adaptation of game content by traditions, customs, and beliefs of a certain nation (Pyae, 2018), including translation, attributes, etc.

Not surprisingly, gamification as a new method in educational practices is perceived with a certain bias. This effect has been investigated by specialists from different fields of

scientific knowledge, synthesizing general conclusions into universal concepts of perception of gamification not as a cognitive problem, but as a tool for solving a number of learning tasks (Legaki et al., 2021). Such dissonance in the perception of game elements as an indicator of a progressive educational process and the unknown and new, which completely disappears after getting acquainted with the specifics of gamification.

Discussions

In Ukraine, the process of gamification inclusion in the educational process is gradually developing. The introduction of variable game elements in the educational process stimulates the improvement of learning efficiency (Treiblmaier & Putz, 2020). In modern quarantined conditions the introduction of distance learning in the game format is a powerful addition to the standard program, helping within its limits to create an additional format of techniques for mastering the necessary knowledge and forming skills and abilities. In the field of culture and art at the level of higher education institutions gamification and traditional methods of training future specialists are integrated. This synthetic interaction determines the diversity of the educational process, its constant relevance. Besides, gamification as an effective means not only for mastering theory but also practice can create a promising model for comprehensive regular training of specialists, contributing to the continuous improvement of hearing, artistic and aesthetic perception, sense of rhythm, tact, etc. (Putzet al., 2020)

The game acts as a tool for learning certain knowledge and skills. Accordingly, the process of gamification can make the stage of constant practice for the formation of relevant skills more interesting. For example, elements of gamification can be various forms of tests and surveys in the online format, interactive learning materials, developmental applications, for example, applications for ear training for musicians. In addition to the aspect of interest that gamification provides, it uses the tactics of diversity in the educational process. The use of different teaching methods and approaches in a harmonious combination make it possible to create the necessary conditions for mastering key competencies. Multifunctionality of the game educational element includes its diagnostic, corrective, stimulating-motivational, didactic, developmental, evaluative-agnostic functions that support the effectiveness of this method (Metwally, 2021).

Separate studies in this direction address the issues of gender- and age-specific perception of gamification in the educational process. Studies by Spanish researchers have established a correlation between the age peculiarities of gamification in the educational process. They were more relevant for younger social groups, while for students another

educational technique of flipped learning is more effective (Parra-González et al., 2021). The older age category of respondents, according to the questionnaires conducted, are more involved in the learning process, which has not only a stimulating motivational aspect but allows for a wider range of information. However, the study once again confirms the effectiveness of active teaching methods, including both elements of gamification and other modern techniques and approaches. This is explained by a wide range of gamification possibilities and a variety of forms of its application.

Interesting in this direction are the studies of Danish scientists who analyzed the results of experiments with virtual reality in an educational context (Nortvig et al., 2020). According to them, in the field of culture and art VR can be a powerful direction for the formation of educational strategies. These studies proved the effectiveness of integrating authentic educational space into a digital environment. The experiment revealed the high effectiveness of extending the physical learning space digitally with the involvement of practices where students have to develop relevant skills. Yes, the generation of conditional environment allows creating an illusion of teacher-student interaction in an educational context to form necessary skills and abilities, implement the regulatory and control-evaluation function, acting as a simulation of the real learning space. The concept of constant practice and critical evaluation of its performance is the key to the formation of future specialists in the field of culture and art (Edwards & I'Anson, 2022).

Gamification of the educational process encourages the development of critical thinking in students. Art acts as a means of personal education, integrating the rational and affective components, and, by synthesizing them, is able to create a new creative object, to become a professional, implementing the acquired knowledge in practice. Didactic approaches that use game elements to form a creative personality are more effective because the power of cultural and artistic education lies in the ability to form systemic thinking of students and contribute to the establishment of new forms of the worldview of future masters (Molderez & Ceulemans, 2018).

The growth of intention to apply gamification in the cultural sphere contributes to the growth of interest in this topic in contemporary research. In particular, Polish scholars have conducted a study substantiating the phenomenon of the influence of the availability of game elements for mobile devices on the potential intention to visit museums (Bieszk-Stolorzetal, 2021). The same situation can be observed in the educational sphere, as the potential focus on the integration of game elements into the learning process has a positive effect on student interest. Feelings of mobility and hedonism from the use of game elements in the learning

process act as potential benefits of the educational model and have a significant impact on the user experience and then on the acceptance of effectiveness and outcomes. Causal relationships show a constructive interaction between gamification and the derivation of the theoretical or practical individual or group benefits. Thus, as a result of using games during learning, it is possible to obtain and assimilate information, to realize experiences, to put acquired skills into practice, to communicate socially, etc. (Hsu & Chen, 2018).

Research on students' individual characteristics as factors influencing their gamification experience is interesting. While some studies argue that the effectiveness of gamification tools is independent of gender or age (Putz et al., 2020), others argue the opposite. For example, gender can influence students' perceptions of the game elements being implemented, leading to a relationship between the user's individual characteristics and their article or psychoemotional traits (Denden et al., 2021). The situation is the same with age-specific characteristics. Neural connections build up more slowly over time, which leads to a slowing down of learning processes, so age specificity is not essential, but also plays its role.

Digital gamification has many advantages. First of all, gamification acts as a kind of marketing tool, it is a promising way to increase user attraction. Gamification as a social phenomenon is focused on the satisfaction of basic psychological needs and in the case of educational practices the combination of practical benefits with a hedonic component (Bitrián et al., 2021). At the same time, in the field of culture and art, the gamification process plays a special role. It contributes to the productivity of participants in the educational process because it depends on the professional role of the user, which leads to the motivational functionality of game elements (Gerdenitsch et al., 2020).

At present, the aspect of personality in learning is being actualized because a lot of attention in the process of distance education has been assigned to the process of self-regulation through the practice of self-determination and self-control. In many aspects, distant learning had an experimental character, because in traditional approaches to teaching professional disciplines in the field of culture and art modern technologies were used as auxiliary, and in some places were not involved in the educational process at all. Mechanics of gamification allow one to independently manage the educational process allowing one to achieve certain goals by choosing the ways of their realization. Elements of social gamification can create the conditions of a communicative context, but still face certain limitations (Krath et al., 2021). In particular, the possibility of a dynamic gamification process within an activity with a large number of participants becomes more difficult. Technical possibilities do not allow for the definitive transfer of group forms of gamification into the digital space.

Increased interest and emphasis on the prospects of the studied topic is confirmed by a number of scientific studies containing bibliometric analysis and literature review of works directly related to the issues of gamification of the educational process. Such works include assessment of the current state of scientific development and forecasts of further research directions, which include research on gamification personalization, peculiarities of educational process participants within game communication, student involvement, efficiency in certain areas (Behl et al., 2022). One promising area for further development remains the correlation between students' intrinsic and extrinsic motivation in the context of gamification of the educational process, manifested in the influence of external factors (such as pandemic and distance education) and internal, formed directly in accordance with mental conditions (Feng et al., 2022). Norwegian studies have experimentally proved an improvement in task performance when gamification is involved in the educational process. At the same time, it had a positive effect on the timeliness of students' task completion (Hosseini et al., 2022).

Consequently, the main limitations in the context of this study lie in the lack of general statistical data. Fragmentary evidence partially reveals the essence of the gamification process in the European educational process. At the same time, the informativeness of the data on the effectiveness of this process is limited, which is associated with a number of psycho-emotional features of the human perception of innovation. The specific nature of behavioral psychology creates a number of limitations for the active implementation of gamification in the educational process and, accordingly, obstacles to its achievement. Regarding the future directions of this subject, the specifics of gamification involvement in education and the key approaches to its implementation remain relevant. A separate aspect is a more detailed development of gamification methods of educational practices in the field of culture and art and a more detailed study of the specifics of each specialty. In this vein, future research on personal forms of gamification perception, determination of potential and efficiency of game elements in the educational process, and comprehension of the results of their implementation in the educational process under regional specific conditions are promising.

Conclusions

During the study, the effectiveness of gamification in the process of educational training of future specialists in the field of culture and arts was confirmed, the main directions of gamification and possibilities of their practical use were highlighted. The main principles of the implementation of the game element in the educational process were substantiated and the essential features of gamification as a tool for education modernization were revealed. As a

result of the study, it was found that gamification has a positive impact on the assimilation of knowledge needed by future specialists in the field of culture and arts, mastering of skills and abilities, mastering of basic competencies. Interactive learning materials create a potential opportunity to realize the potential of students, allowing them to increase their productivity.

However, the process of gamification of the educational process is not permanent and complete. In Ukraine it still retains a haphazard nature, focusing on situational needs. The world pandemic and distance learning caused the activation of this process in the context of difficulties, causing in the context of the need to keep students focused on learning, increasing their motivational interest and involvement in the process. The peculiarities of gamification development and functioning within different educational areas, including culture and art, require close attention and active further development. However, the prospects of such a teaching method including gamification as one of the elements of mastering knowledge and skills is confirmed by a number of studies, which leads to the opinion about its high efficiency under the conditions of correct use.

References

Aguiar-Castillo, L., Clavijo-Rodríguez, A., Hernández-López, L., De Saa-Pérez, P., & Pérez-Jiménez, R. (2021). Gamification and deep learning approaches in higher education. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *29* (100290), 100290. https://doi.org/10.1016/j.jhlste.2020.100290

Bai, S., Hew, K. F., & Huang, B. (2020). Does gamification improve student learning outcome? Evidence from a meta-analysis and synthesis of qualitative data in educational contexts. *Educational Research Review*, *30* (100322), 100322. https://doi.org/10.1016/j.edurev.2020.100322

Behl, A., Jayawardena, N., Pereira, V., Islam, N., Giudice, M. D., & Choudrie, J. (2022). Gamification and e-learning for young learners: A systematic literature review, bibliometric analysis, and future research agenda. *Technological Forecasting and Social Change*, 176 (121445), 121445. https://doi.org/10.1016/j.techfore.2021.121445

Bieszk-Stolorz, B., Dmytrów, K., Eglinskiene, J., Marx, S., Miluniec, A., Muszyńska, K., Niedoszytko, G., Podlesińska, W., Rostoványi, A. V., Swacha, J., Vilsholm, R. L., & Vurzer, S. (2021). Impact of the availability of gamified e-guides on museum visit intention. *Procedia Computer Science*, *192*, 4358–4366. https://doi.org/10.1016/j.procs.2021.09.212

Bitrián, P., Buil, I., &Catalán, S. (2021). Enhancing user engagement: The role of gamification in mobile apps. *Journal of Business Research*, 132, 170–185. https://doi.org/10.1016/j.jbusres.2021.04.028

DalponteAyastuy, M., Torres, D., & Fernández, A. (2021). Adaptive gamification in Collaborative systems, a systematic mapping study. *Computer Science Review*, *39* (100333), 100333. https://doi.org/10.1016/j.cosrev.2020.100333

de la Peña, D., Lizcano, D., & Martínez-Álvarez, I. (2021). Learning through play: Gamification model in university-level distance learning. *Entertainment Computing*, *39* (100430), 100430. https://doi.org/10.1016/j.entcom.2021.100430

Denden, M., Tlili, A., Essalmi, F., Jemni, M., Chen, N.-S., & Burgos, D. (2021). Effects of gender and personality differences on students' perception of game design elements in educational gamification. *International Journal of Human-Computer Studies*, 154 (102674), 102674. https://doi.org/10.1016/j.ijhcs.2021.102674

Donnermann, M., Lein, M., Messingschlager, T., Riedmann, A., Schaper, P., Steinhaeusser, S., & Lugrin, B. (2021). Social robots and gamification for technology-supported learning: An empirical study on engagement and motivation. *Computers in Human Behavior*, *121* (106792), 106792. https://doi.org/10.1016/j.chb.2021.106792

Edwards, R. M., &I'Anson, J. (2022). An innovative method of data analysis: Using art as a lens through which to view pharmacy undergraduate students' learning and assessment practices. *Research in Social & Administrative Pharmacy: RSAP*, *18* (1), 2213–2221. https://doi.org/10.1016/j.sapharm.2021.05.011

Feng, Y., Yi, Z., Yang, C., Chen, R., & Feng, Y. (2022). How do gamification mechanics drive solvers' Knowledge contribution? A study of collaborative knowledge crowdsourcing. *Technological Forecasting and Social Change*, 177 (121520), 121520. https://doi.org/10.1016/j.techfore.2022.121520

Gerdenitsch, C., Sellitsch, D., Besser, M., Burger, S., Stegmann, C., Tscheligi, M., &Kriglstein, S. (2020). Work gamification: Effects on enjoyment, productivity and the role of leadership. *Electronic Commerce Research and Applications*, 43 (100994), 100994. https://doi.org/10.1016/j.elerap.2020.100994

Hammedi, W., Leclercq, T., Poncin, I., &Alkire (Née Nasr), L. (2021). Uncovering the dark side of gamification at work: Impacts on engagement and well-being. *Journal of Business Research*, *122*, 256–269. https://doi.org/10.1016/j.jbusres.2020.08.032

Hosseini, C., Humlung, O., Fagerstrøm, A., &Haddara, M. (2022). An experimental study on the effects of gamification on task performance. *Procedia Computer Science*, 196, 999–1006. https://doi.org/10.1016/j.procs.2021.12.102

Hsu, C.-L., & Chen, M.-C. (2018). How does gamification improve user experience? An empirical investigation on the antecedences and consequences of user experience and its mediating role. *Technological Forecasting and Social Change*, *132*, 118–129. https://doi.org/10.1016/j.techfore.2018.01.023

Krath, J., Schürmann, L., & von Korflesch, H. F. O. (2021). Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games, and game-based learning. *Computers in Human Behavior*, 125 (106963), 106963. https://doi.org/10.1016/j.chb.2021.106963

Legaki, N.-Z., Karpouzis, K., Assimakopoulos, V., & Hamari, J. (2021). Gamification to avoid cognitive biases: An experiment of gamifying a forecasting course. *Technological Forecasting and Social Change*, 167 (120725), 120725. https://doi.org/10.1016/j.techfore.2021.120725

Metwally, A. H. S., Nacke, L. E., Chang, M., Wang, Y., & Yousef, A. M. F. (2021). Revealing the hotspots of educational gamification: An umbrella review. *International Journal of Educational Research*, *109* (101832), 101832. https://doi.org/10.1016/j.ijer.2021.101832

Molderez, I., & Ceulemans, K. (2018). The power of art to foster systems thinking, one of the key competencies of education for sustainable development. *Journal of Cleaner Production*, *186*, 758–770. https://doi.org/10.1016/j.jclepro.2018.03.120

Mullins, J. K., & Sabherwal, R. (2018). Gamification: A cognitive-emotional view. *Journal of Business Research*, *106*, 304–314. https://doi.org/10.1016/j.jbusres.2018.09.023

Nortvig, A.-M., Petersen, A. K., Helsinghof, H., & Brænder, B. (2020). Digital expansions of physical learning spaces in practice-based subjects - blended learning in Art and Craft & Design in teacher education. *Computers & Education*, *159* (104020), 104020. https://doi.org/10.1016/j.compedu.2020.104020

Parra-González, M. E., López-Belmonte, J., Segura-Robles, A., & Moreno-Guerrero, A.-J. (2021). *Gamification and flipped learning and their influence on aspects related to the teaching-learning process. Heliyon*, *7* (2), e06254. https://doi.org/10.1016/j.heliyon.2021.e06254

Putz, L.-M., Hofbauer, F., & Treiblmaier, H. (2020). Can gamification help to improve education? Findings from a longitudinal study. *Computers in Human Behavior*, *110* (106392), 106392. https://doi.org/10.1016/j.chb.2020.106392

Pyae, A. (2018). Understanding the role of culture and cultural attributes in digital game localization. *Entertainment Computing*, *26*, 105–116. https://doi.org/10.1016/j.entcom.2018.02.004

Salemink, E., de Jong, S. R. C., Notebaert, L., MacLeod, C., & Van Bockstaele, B. (2022). Gamification of cognitive bias modification for interpretations in anxiety increases training engagement and enjoyment. *Journal of Behavior Therapy and Experimental Psychiatry*, 101727, 101727. https://doi.org/10.1016/j.jbtep.2022.101727

Treiblmaier, H., & Putz, L.-M. (2020). Gamification as a moderator for the impact of intrinsic motivation: Findings from a multigroup field experiment. *Learning and Motivation*, *71* (101655), 101655. https://doi.org/10.1016/j.lmot.2020.101655

van Roy, R., & Zaman, B. (2018). Need-supporting gamification in education: An assessment of motivational effects over time. *Computers & Education*, *127*, 283–297. https://doi.org/10.1016/j.compedu.2018.08.018

van Roy, R., & Zaman, B. (2019). Unravelling the ambivalent motivational power of gamification: A basic psychological needs perspective. *International Journal of Human-Computer Studies*, *127*, 38–50. https://doi.org/10.1016/j.ijhcs.2018.04.009

Xu, Jiahong, Du, H. S., Shen, K. N., & Zhang, D. (2022). How gamification drives consumer citizenship behaviour: The role of perceived gamification affordances. *International Journal of Information Management*, *64* (102477), 102477. https://doi.org/10.1016/j.ijinfomgt.2022.102477

Xu, Joy, Lio, A., Dhaliwal, H., Andrei, S., Balakrishnan, S., Nagani, U., &Samadder, S. (2021). Psychological interventions of virtual gamification within academic intrinsic motivation: A systematic review. *Journal of Affective Disorders*, *293*, 444–465. https://doi.org/10.1016/j.jad.2021.06.070