

GBL in Urban Planning Education: Case Studies of *Metropoli* and *Katopolis* Games

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Abstract: Game-Based Learning (GBL) is becoming an increasingly promising approach in urban education, particularly for teaching about complex urban or metropolitan structures and spatial relationships. This approach enables an engaging exploration of how a city or metropolis functions, combining analytical and intuitive thinking and allowing participants to test various spatial scenarios in a safe environment. In architecture and urban planning, GBL can effectively support the development of spatial awareness and the ability to interpret urban systems, providing a valuable complement to traditional teaching methods. This article presents case studies of two educational games as learning support tools – *Metropoli* and *Katopolis*. These games use card and board game mechanics to introduce key urban planning terms such as city structure, functional layout, transport links, the location of public spaces, and territorial development strategies. Both games function as simplified representations of urban systems, allowing players to explore the consequences of planning decisions by manipulating spatial elements and making strategic choices. Additionally, the games allow participants to examine alternative spatial configurations and observe how their decisions influence overall urban form, thereby supporting learning through experimentation, comparison, and analysis. Research conducted during a series of educational workshops using the *Metropoli* game, involving school and university students, indicates that GBL supports active learning, increases engagement and develops spatial awareness. It was noted that the game helped to better illustrate the structure of the city, the interdependencies between functions, and the impact of spatial decisions on the quality of the urban environment, as well as facilitating participants' own interpretations of urban phenomena and discussion of alternative solutions. The findings suggest that educational games can become a valuable complement to traditional teaching methods and serve as a useful tool to support education in architecture and urban planning. The article identifies potential directions for further development of GBL approach in urban education and provides recommendations for integrating games into the academic programme and participatory workshops, emphasising their potential for developing analytical and strategic skills as well as teamwork abilities.

Keywords: Game-based learning, Urban planning education, Urban games, City structure, Metropolitan structure

1. Introduction

Game-based learning (GBL), understood as a research and teaching approach, has been more widely adopted in higher education relatively recently. A surge in the number of academic papers published on this topic occurred around 2015. A systematic literature review conducted by Aragonez T., Saur-Amaral I., and Gouveia M. (2021) indicates that GBL is most frequently applied in fields such as computer science, business and management, and social sciences. Although this method is widely used in higher education, its application in the fields of architecture and urban planning remains limited or merely fragmentary.

In the subject literature, the use of GBL in architecture and urban planning most often appears as descriptions of individual teaching experiments (Çekmiş and Karakaya, 2024; Fonseca, D. et al, 2021), one-off workshops (Poplin, 2011; Poplin, 2018), participatory tools (Brković Dodig, Groat, 2019; Mayer I. et al, 2014), city promotional instruments in the form of dedicated board games (Devisch, Poplin, Sofronie, 2016; Pinos, 2019), or as computer simulations or serious games (Khan, Zhao, 2021; Wilkinson, 2016). However, a clear research gap can be observed in the form of a lack of in-depth studies on the effectiveness of game-based learning in teaching architecture and urban planning. There is also a lack of coherent didactic models, design guidelines, and comparisons of learning outcomes.

This article also presents two actual game projects created at the Faculty of Architecture of the Silesian University of Technology in Gliwice, Poland. The authors describe the game *Metropoli*, which focuses on the GZM Metropolis, and *Katopolis*, a game related to the city of Katowice. The implementation and testing of both games during numerous workshops and classes with high school pupils and university students are also described. The conducted tests, research, and surveys allow for the presentation of original insights and conclusions regarding the study of urban and metropolitan spaces. The article includes practical conclusions and recommendations in the context of learning urban planning through games. The authors also point out new directions for the development of GBL tools in the context of urban planning education.

2. State of Research

Research indicates a high potential for the GBL teaching method as a support in understanding occurring spatial relationships and teaching about the complexity of urban and metropolitan structures (Mazur et al, 2025). The method allows for a better understanding of the city as a complex system of interconnected vessels. GBL can become a valuable supplement to traditional teaching methods, enabling greater engagement of pupils or students in the process of learning the principles of how urban structures function. Players learn in practice the dependencies between various urban aspects, such as economy, transport, or quality of life. GBL combines analytical and intuitive thinking, which allows for testing different spatial scenarios in a safe, simplified environment, without bearing the real consequences of the decisions made (Sousa et al, 2026).

Educational games used during the teaching of architecture and urban planning can serve as tools to demonstrate the connection between abstract concepts and concrete solutions. This creates an opportunity for the active application of design principles, as opposed to merely passive learning of these principles. As noted by (Çekmiş and Karakaya, 2024), the goal of architectural games is to create a learning space that will be more engaging and creative, which directly refers to Experiential Learning Theory (ELT). The application of this method in teaching architecture and urban planning helps improve the quality of teaching, as well as increase student engagement through collaboration and practical competence acquisition (Brković Dodig, Groat, 2019).

Despite this promising approach, GBL is not a frequently analyzed method in the field of architecture and urban planning as a tool for systematic academic education. The authors point out the lack of a “common definition of games as teaching tools in architecture and urban planning” (Brković Dodig, Groat, 2019). This is also confirmed by Tóth (2015), who notes that there is, however, “*a lack of analysis of urban games as it relates to their possible contribution to the field of urban planning*”. Sousa (2025) also notes a lack in the literature regarding the impact of analog games as a tool for creating an interactive space conducive to understanding the dynamics of spatial structures.

An analysis of various games in the field of urban planning allowed Tóth (2015) to identify the key advantages of their use. These primarily include raising social awareness about urban challenges and promoting the active participation of residents in shaping space. Games also constitute an effective tool supporting communication between stakeholders and facilitating decision-making processes by gathering valuable data, while playing a significant role in transferring specialized knowledge within professional education. In the context of designing such tools, the necessity of defining a clear didactic goal of the game, expected results, and the audience profile is increasingly emphasized, as well as the importance of spatial scale and embedding the game in a specific local context (Prilenska, Liaas & Paadam, 2015). Tóth (2015), however, points out a clear shortage of games that are designed from the very beginning with didactic goals in mind, combining pedagogical principles with city design mechanics into a coherent whole.

Mazur et al (2025) and Sousa (2023) indicate the effectiveness of GBL, in the context of architecture and urban planning, in supporting the shaping of spatial awareness, as well as developing the skills to interpret urban systems. It is also emphasized that games have significant potential in teaching about urban functions and layouts (Beckett and Shaffer, 2005). Authors dealing with the design of urban games also draw attention to the importance of feedback mechanisms and the possibility of modifying the course of the game during gameplay as elements strengthening the learning process (Prilenska, Liaas & Paadam, 2015). Gamification “disarms” the complicated technical language of architecture, making it accessible to laypeople. Thanks to simplified mechanics (e.g., tile-laying, moving LEGO bricks), individuals without formal education in the field gain a sense of agency and a real impact on shaping their surroundings.

As Tóth (2015) notes, modern cities are complex systems whose mechanisms and dynamics can be effectively modeled through games, which act as representations of reality. A tool in the form of a game allows for experimenting with design ideas and visualizing gathered data without bearing real consequences. Khan and Zhao (2021) draw conclusions from the use of the role-playing game *Cities: Skylines*, where along with plot development and the possibility of obtaining feedback, players can continuously control the surroundings and characters. This provides them with constant interactivity and the ability to face upcoming challenges.

According to research on several games conducted by Sousa (2023), participants perceived the games used by the author as planning tools. Players also stated that analog games in this context can be better than digital ones. The use of urban games can be a useful research and teaching tool for observing how people perceive and interpret the city, and how they understand the changes occurring in its structure (Casakin, 2008).

Tan (2019) points to the growing role of games as tools used in planning and decision-making practice. Today, urban games are increasingly used in the daily work of decision-makers, urban planners, and architects. Both games and urban planning processes require the collaboration of experts, the integration of different types of knowledge, and the involvement of a broad spectrum of stakeholders. In both cases, effective communication and coordination of actions play a key role, which is essential for developing coherent and acceptable solutions.

3. Case Studies of Metropoli and Katopolis Games

This case study describes two educational tools: the games *Metropoli* and *Katopolis*. Both games are based on classic board and card game mechanics aimed at education, regardless of age or prior knowledge in the fields of urbanism and spatial planning. The guiding theme of the games focuses on a post-industrial region and its cities located in southern Poland. This area is unique in its structure on a national scale.

The designed games constitute simplified models of urban and metropolitan systems, enabling the introduction of key urban planning concepts, such as city structure, functional layout, transport connections, the location of public spaces, and territorial development strategies. The game mechanics are based on manipulating spatial elements and making strategic decisions, which allows players to explore the consequences of planning choices in a safe, simulated environment.

A significant element of both case studies is the opportunity to observe the dependencies between the players' actions and the resulting configuration of the urban structure, which supports the learning process through experimentation, the comparison of different scenarios, and the analysis of spatial and functional effects.

In both cases: *Metropoli* and *Katopolis*, the widely known board game *Monopoly* was the starting point for their creation. The game's authors concluded that referencing the rules of the popular board game would serve as the first step toward an easier and faster introduction to the new gameplay, as well as an encouraging element. In addition to the inspired game board, another important element of the games are the cards, which form traditional decks of 52 cards (without a joker). The suits and colors were used to categorize municipalities (*Metropoli*) or districts (*Katopolis*). The use of widely recognized game mechanics appeals to a broader audience, regardless of players' experience levels. The game feels more "familiar," and attention is focused on the newly added urban elements rather than on trying to master new, complicated rules.

Since the component cards form a standard deck, both games can also be used for traditional games such as solitaire. In this game, the statistical data detailed on the *Metropolis* or *Katowice* cards can be used to form a specific image of a city or region once they are laid out. For example, by selecting the indicator that determines the greenery level of a given municipality or district as a reference point, completing the solitaire layout will create a symbolic representation of the most and least green municipalities or districts.

3.1 Metropoli - GZM Metropolis Game

Metropoli - GZM Metropolis Game is an educational card and board game developed to present the structures of the GZM Metropolis located in the Silesian Voivodeship in Poland. The game was developed by architecture students at the Faculty of Architecture of the Silesian University of Technology during coursework and was further developed by the *URBANMODEL* student research group between 2023 and 2025. The project combines elements of education, regional promotion, and game design, illustrating the complexity and diversity of the GZM Metropolis in a manner that is attractive and accessible to the audience. The aim of the project was to create an educational tool that familiarizes the player with the structure and functioning of the Metropolis in an engaging way. The game promotes knowledge about the region, supports the integration of the local community, and develops the spatial and strategic competencies of its participants. The project was developed in two stages:

3.1.1 The GZM Metropolis game card deck

The first stage of the project involved developing a complete deck of traditional playing cards, which simultaneously serve as a representation of all the municipalities comprising the GZM Metropolis. Card typology and graphic template were created, for which data regarding individual municipalities were subsequently acquired and processed, transforming them into unique "business cards" in the form of playing cards. Each card includes, among other things: the name of the municipality; the name of a selected architectural, industrial, or urban object characteristic of the given municipality; an illustration of the object along with its virtual 3D model; basic statistical data (number of inhabitants, area, percentage share of green and water areas, and the total length of bicycle paths within the municipality). All data is derived from publicly available sources, including Statistics Poland (GUS) and the BDOT10k database. The data and statistics were retrieved in 2023.

The backs of the cards act as a puzzle—when arranged correctly, they form a map of the GZM Metropolis. The map displays the administrative structure (municipality boundaries) and the transport network (national roads and highways) of the GZM Metropolis. In the center of each card back is a QR code that, when scanned, redirects the user to the Sketchfab platform. There, a 3D model of the object depicted on the front of the card is hosted, along with its immediate surroundings (an area of 600x400m) (Amistadi et al, 2024).

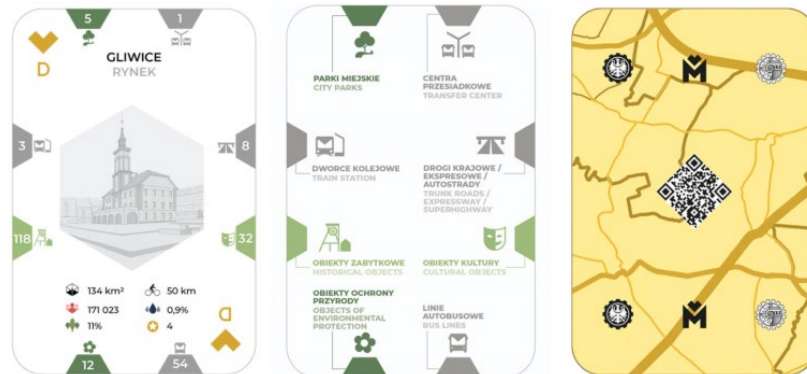


Figure 1: GZM Metropolis Game cards, from the left: front, pictograms description, back,
Source: Authors' own material

3.1.2 The Metropoli board game

The second stage of the project involved the development of a dedicated board game, constituting an expansion of the *GZM Metropolis Game* card deck concept. This stage was carried out as part of the activities of the *URBANMODEL* student research group. The rules of the game are inspired by classic "Monopoly"—players sequentially acquire municipalities, creating their own "mini-metropolises". As part of the project: pawns representing selected objects from the Metropolis area were designed and 3D-printed, maintaining their actual proportions, which enables a visual comparison between structures, such as the Spodek in Katowice and the Market Square in Gliwice; a regional knowledge quiz was developed, which constitutes an integral element of the gameplay, combining entertainment with education.



Figure 2: Elements of Metropoli game, source: authors' own material

3.2 Katowice Game and Katopolis Game

Following the success of the *GZM Metropolis Game*, a twin project was implemented in the subsequent academic year, focusing on the capital of the Silesian Voivodeship and the principal city of the GZM Metropolis, namely Katowice. In 2024, as part of their coursework, a group of students created a deck of cards analogous to the one in the *GZM Metropolis Game*; however, the unit of the cards, instead of municipalities (as in the *GZM Metropolis Game*), were city districts – the corresponding color scheme of the cards indicated the location of a given district relative to the city (northern districts, southern and western districts, eastern districts, and the city center). A new type of card was also introduced: function cards. The function cards, divided into opportunity cards and threat cards, reflect the strategy of the city of Katowice and visualize city-forming factors related to: housing,

environment and space, economy, and society. For example, an opportunity card is *Urban Greening*, while a threat card is the *Urban Heat Island Effect* (Bański et al, 2025).



Figure 3: Katowice Game cards, from the left: front, pictograms description, opportunity card, threat card, Source: Authors' own material

Similar to the *GZM Metropolis Game*, the *URBANMODEL* student research group expanded the *Katowice Game* project into a board game in 2025. This expansion included the creation of a game board, 3D-printed pawns representing selected landmarks from the districts, a quiz about Katowice, and a custom-designed game die. The board game adopted rules that combine the traditional games of *Monopoly* and *Ludo*, adapted into a Katowice edition.



Figure 4: Elements of Katopolis game, Source: Authors' own material

4. Research Methodology

The research presented in this article was conducted as part of a series of educational workshops using the *Metropoli-GZM Metropolis Game*. The aim of the research was to understand how the game-based learning approach supports the learning process of issues related to architecture and urban planning, with particular emphasis on aspects such as active learning, participant engagement, and the development of spatial awareness. The workshops were conducted with the participation of diverse target groups, including high school students and university students, which allowed for the observation of knowledge acquisition methods by individuals with varying levels of experience and competence in spatial planning. The study was designed as an exploratory pilot investigation of the perceived usefulness of game-based learning tools in urban planning education.

During the workshops, participants initially focused mainly on collecting municipalities and completing game objectives. As the gameplay progressed, many began to discuss transport connections, spatial relationships, and the strategic significance of individual municipalities within the metropolitan structure. Such observations suggested a gradual shift from rule-oriented gameplay towards more spatially informed decision-making.

Rather than measuring learning outcomes directly, the research focused on observing participants' interactions, discussion patterns, and engagement with urban planning concepts during gameplay. This approach enabled the identification of learning-related behaviors, participants' interpretations of urban phenomena, and the potential of the developed games as educational tools supporting discussion, reflection, and spatial reasoning in urban planning education.

4.1 Workshops – Metropoli Game

A series of workshops utilizing the *Metropoli - GZM Metropolis Game* was conducted. In 2024, workshops were held as part of festivals such as *The Researchers' Night* at the Silesian University of Technology in Gliwice, Poland, and the 8th edition of *The Silesian Science Festival*, which takes place at the International Congress Centre in Katowice, Poland. In 2025, the *URBANMODEL* student research group received two grants from the Metropolitan Science Support Fund to conduct workshops in high schools utilizing the *Metropoli - GZM Metropolis Game*. In total, members of the *URBANMODEL* student research group conducted workshops in 20 high schools across the Silesian Voivodeship in Poland during the periods of March–June and September–December. The workshop program included a short introductory presentation, familiarization with the card deck (assembling the puzzle from the card backs, playing solitaire based on the urban indicators featured on the cards), followed by playing the *Metropoli* game. At the conclusion of the workshops, participants were asked to complete a survey, which allowed for the assessment of the game's reception among high school youth. The results of the survey are presented in the subsequent sections of this article.



**Figure 5: Playing the *Metropoli* game during the workshop in Academic High School in Rybnik, 2025,
Source: Authors' own material**

4.2 Workshops – Katopolis Game

Like the *Metropoli - GZM Metropolis Game*, the *Katopolis* game also served as a tool for conducting workshops. The workshops took place during the 9th *Silesian Science Festival* and during the 4 *Design Days* in 2026. These sessions included gameplay of *Katopolis*. The workshop participants ranged in age from children to adults.



**Figure 6: Playing the *Katopolis* game during the workshop at the 9th *Silesian Science Festival*, 2025,
Source: Authors' own material**

4.3 Questionnaire Results

A survey was conducted among the participants of the workshops held under both grants from the Metropolitan Science Support Fund, which were based on gameplay of the *Metropoli - GZM Metropolis Game*. The research sample consisted of 202 individuals aged 15 to 19. The provided chart (Figure 7) presents the responses to the following questions:

- Evaluate the extent to which the *GZM Metropolis Game* cards are useful as a source of knowledge about the municipalities.
- Evaluate the extent to which the *Metropoli* game is useful as a medium for conveying knowledge about the GZM.

Respondents selected their answers based on the following criteria: low, medium, high, and very high. The survey participants responded to the posed questions as follows:

- 103 [51%] respondents rated the usefulness of the cards as a source of knowledge about the municipalities as very high, 70 [35%] as high, 26 [13%] as medium, and 3 [1%] as low.
- 81 [40%] respondents rated the usefulness of the *Metropoli* game as a medium for conveying knowledge about the GZM as very high, 84 [42%] as high, 32 [16%] as medium, and 5 [2%] as low.

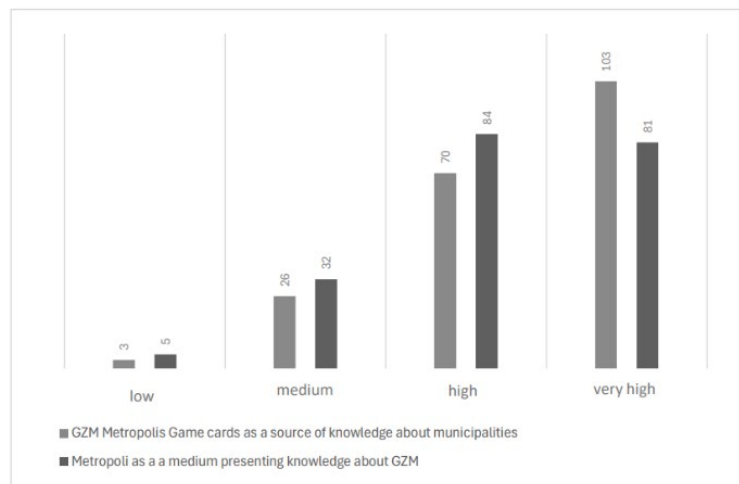


Figure 7: A chart showing the results of a survey conducted among workshop participants

A survey among young people showed the positive educational value of the *Metropoli - GZM Metropolis Game* in this age group, particularly the cards as a useful tool for conveying knowledge about municipalities.

5. Results and Discussion

The conducted research, workshop classes, and collected survey data indicate that the application of the game-based learning approach using the *Metropoli* and *Katopolis* holds significant educational value in the context of teaching urban planning issues. Particularly noticeable is the high level of reception of the game as a tool supporting the understanding of city structure and basic functional and spatial relationships. High and very high ratings for the usefulness of both the game cards as a source of knowledge about municipalities, and the gameplay itself as a medium presenting metropolitan issue, suggest that the game effectively supports the knowledge acquisition process among high school youth.

The obtained results and observations from the workshops suggest that educational games can constitute a valuable supplement to traditional teaching methods and act as a bridge between urban planning theory and its practical, intuitive understanding. In particular, it was noted that gameplay fosters the formulation of one's own interpretations of urban phenomena, engaging in discussions on alternative spatial solutions, and developing analytical and strategic competencies, which is significant in architectural and urban planning education. An additional effect of the workshops was the intensification of teamwork and the negotiation of decisions, which reflects real-world planning processes.

5.1 Project Limitations

Several limitations of the study should be acknowledged. The evaluation was based primarily on participants' subjective assessments of the usefulness of the games as educational tools rather than on objective measures of learning outcomes. Furthermore, no control group was used, making it difficult to determine the extent to which the observed effects resulted directly from the gameplay. The participants were drawn from the Upper Silesian and Zagłębie Metropolis region, which may have influenced their familiarity with the subject matter and limited the generalisability of the findings. In addition, a positive evaluation of the games may partly reflect their novelty and attractiveness in comparison with traditional teaching methods rather than measurable learning outcomes.

6. Conclusions and Future Directions

The results of the research indicate that educational games can serve as a valuable complement to traditional teaching methods in architecture and urban planning. The use of a game-based learning approach promotes a better understanding of complex spatial relationships and enables active exploration of the mechanisms underlying the functioning of urban and metropolitan structures. Games support the development of analytical and strategic skills, whilst strengthening teamwork abilities through participants' collaboration in the spatial decision-making process. In this context, GBL does not replace traditional teaching methods, but expands them to include an experiential and experimental dimension, which proves particularly important in the early stages of urban planning education.

One of the key challenges in designing urban planning games remains striking a balance between the appeal of gameplay and its educational value. An excessive focus on game mechanics can lead to a superficial understanding of the knowledge being conveyed and divert attention from real-world urban planning issues. Future research should focus on developing a design framework that integrates educational objectives, simulation realism, and engaging game mechanics, whilst enabling the evaluation of learning outcomes and the transfer of knowledge to design practice.

Attention should be paid also to the application of more objective assessment methods, including pre- and post-tests, as well as the use of control groups to better evaluate the educational effectiveness of game-based learning tools. Future studies should also involve participants from different regions to generalisability of the results obtained.

Ethics Declaration: The research conducted – the workshops described in this article – did not require the consent of the ethics committee.

AI Declaration: The article was supported by AI tools for text translation and bibliography preparation.

References

- Aleksiuk, S. et al (2023) "Modele struktury Metropolii GZM", pod red. Bradecki, T., Kafka, K., Ludwig, J. i Mól, B., [online], Wydawnictwo Politechniki Śląskiej, <https://doi.org/10.34918/86125>.
- Amistadi, L. et al (2024) "Modele struktury Metropolii GZM - gra w Metropolię: gra karciana, gra planszowa", pod red. Sikora, M., Bradecki, T. i Mularczyk, I., [online], Wydawnictwo Politechniki Śląskiej, <https://doi.org/10.34918/88552>.
- Aragonez T., Saur-Amaral I., Gouveia M. (2021) "Game-based learning in higher education: A systematic literature review", EDULEARN21 Proceedings, 1849–1856. <https://doi.org/10.21125/edulearn.2021.0432>.
- Bański, J. et al (2025) "Gra w Katowice: Modele struktury miasta Katowice – gra karciana", [online], Wydawnictwo Politechniki Śląskiej, <https://doi.org/10.34918/90768>.
- Beckett, K. and Shaffer D. W. (2005), "Augmented by reality: The pedagogical praxis of urban planning as a pathway to ecological thinking", Journal of Educational Computing Research, Vol. 33, No. 1, pp. 31–52, <https://doi.org/10.2190/D5YQ-MMW6-V0FR-RNJQ>.
- Brković Dodig, M. and Groat, L. N. (2019) "Architecture and Urban Planning: Game On", [online], The Routledge Companion to Games in Architecture and Urban Planning: Tools for Design, Teaching, and Research (1st ed.). Routledge. <https://doi.org/10.4324/9780429441325>.
- Casakin, H. (2008). "City Games as a Framework for Studying Spatial Information and the Dynamics of Urban Design". From Negation to Negotiations – Solving the Puzzles of Development. In P. Maiti (Ed.). Pragun - DK Publishers Distributors, New Delhi. pp. 353-374.

- Çekmiş, H. and Karakaya, İ. (2024) "Digital game-based learning in architecture education: Consolidating visual design principles in freshmen", [online], DRArch (International Journal of Design Research and Architecture), Vol. 1, No. 1, <https://drarch.org/index.php/drarch/article/view/204>.
- Devisch, O., Poplin, A. & Sofronie, S. (2016) "The gamification of civic participation: Two experiments in improving the skills of citizens to reflect collectively on spatial issues", *Cities*, Vol. 52, pp. 14–25. <https://doi.org/10.1016/j.cities.2015.11.026>.
- Fonseca, D., et al (2021) 'Mixed assessment of virtual serious games applied in architectural and urban design education', *Sensors*, Vol. 21, No. 9, 3102. <https://doi.org/10.3390/s21093102>.
- Khan T. and Zhao X. (2021) "Perceptions of Students for a Gamification Approach: Cities Skylines as a Pedagogical Tool in Urban Planning Education", [online], 20th Conference on e-Business, e-Services and e-Society (I3E), pp.763-773, https://doi.org/10.1007/978-3-030-85447-8_64.
- Mayer, I., et al (2014) "The research and evaluation of serious games: Toward a comprehensive methodology", *British Journal of Educational Technology*, Vol. 45, No. 3, pp. 502–527. <https://doi.org/10.1111/bjet.12067>.
- Mazur, K. et al (2025) "Comparative analysis of urban and metropolis games: a typology and evaluation framework for participatory and educational city-making", [online], *Sustainability*, Vol. 17, No. 22, 10173, <https://doi.org/10.3390/su172210173>.
- Piños, J. (2019) 'Current trends in using serious games and video games in the field of urban planning', *Kartografické listy / Cartographic Letters*, Vol. 27, No 1, pp. 14–24.
- Poplin, A. (2012) "Playful public participation in urban planning: A case study for online serious games", *Computers, Environment and Urban Systems*, Vol. 36, pp. 195–206, <https://doi.org/10.1016/j.compenvurbsys.2011.10.003>.
- Poplin, A. (2011) "Games and serious games in urban planning: Study cases", in Murgante, B. et al (eds.) *Computational Science and Its Applications – ICCSA 2011. Lecture Notes in Computer Science*, Vol. 6783, Springer, Berlin, pp. 1–14. https://doi.org/10.1007/978-3-642-21887-3_1.
- Poplin, A. (2017) "Serious GeoGames for civic engagement in urban planning", in Yamu, C., Poplin, A., Devisch, O. and de Roo, G. (eds.) *The Virtual and the Real: Perspectives, Practices and Applications for the Built Environment*, Routledge, London, pp. 189–213.
- Prilenska, V., Lias, R. and Paadam, K. (2015) "Games in Communicative Planning: A Comparative Study", [online], *Proceedings of the 7th Nordic Planning Research Symposium (PLANNORD)*, KTH Royal Institute of Technology, Stockholm, <https://www.researchgate.net/publication/316691992>.
- Sousa, M. et al (2026) "Modern Board Games: Can They Be Geogames?", [online], *Urban Planning*, Vol. 11, 10737, <https://doi.org/10.17645/up.10737>.
- Sousa M. (2023) "Modeling urban spaces with cubes: Building analogue serious games for collaborative planning", [online], *International Journal of Film and Media Arts*, Vol. 8, No. 1, pp. 8–35, <https://doi.org/10.24140/ijfma.v8.n1.01>.
- Tan, E. (2020) "Play the city: Dungeons and dragons for cities", in: Gerber, A. and Götz, U. (eds.) *Architectonics of Game Spaces: The Spatial Logic of the Virtual and Its Meaning for the Real*. Bielefeld: transcript Verlag, Bielefeld, pp. 265–276. <https://doi.org/10.1515/9783839448021-018>.
- Tóth, E. (2015) "Potential of games in the field of urban planning", in *Proceedings of the REAL CORP 2015 – Cities Reborn: Planning and Development in Times of Violence and Conflict*, REAL CORP, Ghent, pp. 1031–1040.
- Wilkinson, P. (2016) "A brief history of serious games", in Ma, M. & Oikonomou, A. (eds.) *Serious Games and Edutainment Applications*, Springer, Cham, pp. 17–41, https://doi.org/10.1007/978-3-319-46152-6_2.