

## A business simulation method in educating architects

Michał Kwasek† & Piotr Konwicki‡

Gdańsk University of Technology, Gdańsk, Poland  
University of Hertfordshire, Hertfordshire, England, United Kingdom

**ABSTRACT:** In this article, the authors analyse the application of the business simulation method as a support tool in educating undergraduate architecture students. While running a fictional architectural practice, students learn about the role of an architect in the investment process and are introduced to economic aspects of running a small practice, including the importance of cash flow. They are also made aware about the importance of employability soft skills. The article is based on a simulation tested for several years in teaching classes during which students learn the practical aspects of managing their own architectural design practice, including cost management. A questionnaire survey has been used to assess both the prior knowledge of business principles among the students, as well as the effectiveness of this business simulation method as a learning tool for undergraduate students. Findings indicate that the applied method has improved the employability skills of graduates, in particular with respect to their actual knowledge of practical business skills, including legal, tax and financial issues.

### INTRODUCTION

#### Role of Business Skills in Educating Architects

Over the past few years, the architectural community in Poland began to realise the importance of business aspects in the architect's work. The growing importance is attached to the enhanced role of the architect - going above and beyond the traditional function as a creator of the form of objects and arranger of space for people.

The City of Warsaw's Bureau of Architecture and Spatial Planning undertook research on the current status and requirements for the architectural profession [1]. This qualitative study was conducted among architects active in Warsaw. Its findings stressed the lack of general business and entrepreneurial skills in the profession. The participants agreed that this deficit was due to the lack of relevant education during studies.

The above research findings informed the views of the President of the Association of Polish Architects, Agnieszka Kalinowska-Sołtys who observed that, in addition to being designers, architects are required to perform advisory and managerial functions, as well as being negotiators and accountants [2]. All these requirements form a body of employability skills for undergraduate students, as expected by their future employers.

This and similar comments from architectural professionals prompt the idea to introduce business skills into the education of architecture students [3][4]. In this respect, the discussion in Poland is in line with actions already undertaken by professional bodies in other countries. For example, the Royal Institute of British Architects (RIBA) commissioned studies to assess the current status of architectural education and to develop a plan for improvement [5][6]. The importance of business skills for students (not only in architecture) and the need to include them in curricula are also discussed outside Europe [7].

The discussion about practical and business skills shortcomings in education should be seen in a wider context. The educational process is frequently criticised for failing to offer students the required employability skills, partially because processes applied in teaching are inadequate for actual business practice [8]. Barker found that employers highly value professional competencies of graduates, in particular communication skills, the ability to apply knowledge, logical thinking and critical analysis [9]. When applied to architecture, Murray and Langford established that a new kind of practitioner is required, with strong management skills for the day-to-day running of the practice and for greater involvement in the management of construction processes [10].

To accomplish the intended objectives, the authors of this article believe that, during university education, architects-to-be should be able to encounter real problems that await them in their future professional practice - thus the idea of introducing a business simulation for students.

## BUSINESS SIMULATION EMPLOYED

The Cambridge Dictionary defines simulation as a model of a set of problems or events that can be used to teach someone how to do something [11]. Edumundo applies the above ideas to a business context and presents a view that a business simulation is a tool in which participants manage a fictitious company and make strategic decisions to improve this virtual firm's performance [12]. This approach is expanded by Hall through the concept of creating scenarios applicable in business situations [13].

Business simulation is not a new approach in education [14]. Opinions about its effectiveness are mostly positive [15], although several authors expressed criticism about its oversimplicity [16] and issues related to effectiveness [17].

The study outlined in this article was conducted in the academic year 2023/2024. The presented concept of simulation was applied simultaneously to the third- and fourth-year cohorts of architecture students in the Faculty of Architecture at Gdańsk University of Technology (Gdańsk Tech), Poland, as part of the course Economics of the Investment Process (EIP) - uniquely for this academic year. EIP will now be taught during the third year of studies, however, the previous cohorts followed the original curriculum.

The applied simulation process involved students in the business decision-making process in a mock architecture practice - in line with literature-prescribed simulation design.

The change in the curriculum allowed this research to include an additional aspect of the impact of professional experience on business knowledge and skills: six-month mandatory internships in architectural practices. These professional internships took place during the seventh semester, thus, for one cohort before the EIP course, and for the other after the course in this academic year. During their internships students did not have teaching classes, instead they worked exclusively in the practice. This allowed them to experience real tasks and problems of the architectural profession.

### Simulation Description

In addition to theoretical underpinnings, students were assigned business simulation-related tasks. The brief of the assignment expected them to set up their own businesses. Their attention was focused on the issues of organising the company and ensuring relevant financial cash flow. The assumption was that, as fresh graduates, they did not have the legal qualifications necessary for independently preparing building projects. It implied that their fictional business needed to employ an architect with the required qualifications.

Participants were to solve various business and economic problems designed by the simulation authors and revealed successively during the semester. The simulation required students to independently identify and consider the following issues:

- legal form of the enterprise;
- costs of running a business: initial expenses arising from the founding of the company, fixed and variable costs, as well as depreciation of fixed assets;
- pricing of design work (for various stages of the project);
- the form of employment of the employee (along with the resulting total cost to the employer);
- risks associated with running a company.

The simulation also contained hidden factors, revealed at the end of the course. The purpose of these factors was to create a negative cash flow for students' mock practices. This issue made it possible to notice the factors and the mechanism of creating a negative cash flow, for an extended reflection of business issues affecting management of the practice.

### Research Assumptions Made

The benchmark was established to test the effectiveness of the simulation. The initial state of the students' knowledge and skills was examined. Before the course, students were asked to fill out an anonymous questionnaire with a 5-point Likert scale, containing questions about economic issues in the architectural profession.

In the total of 130 respondents, two groups could be distinguished. The first consisted of the sixth-semester students (49 people), whose work experience was minimal. The second consisted of students who have had at least six months of work experience (81 people). This allowed the authors to assess whether the six-month internship affected students' business knowledge and awareness, by comparing the initial responses between these two groups.

Further, after the EIP course, the students who had internship (2nd group) were asked to fill in the same questionnaire to assess changes in their business knowledge and awareness. Sixty-eight out of 81 students participated. The sixth-semester students were not asked to fill in the 2nd questionnaire due to a different class schedule.

The first group of questions was designed to examine students' self-assessment of knowledge of general economic and entrepreneurial issues; the second to determine the degree of their interest in general economic issues; the third set assessed students' knowledge of specific, detailed topics relevant for the architectural profession. The questions addressed issues, such as the level of wages among architects, taxes and their impact on the relationship between net pay and total cost to the employer, as well as knowledge of the local architectural market (such as names of the local practices).

#### Assessment of the Effectiveness of the Business Simulation Method Used

The impact of the simulation varied depending on the analysed issues. The comparison of survey results between the six and eight semester demonstrates that participation in the internships improved students' entrepreneurial knowledge and skills only marginally (Figure 1 presents self-assessment and Figure 3 the actual knowledge of students). Likewise, internship participation did not increase students' self-assessment of the business environment. The internships had a similar, very low impact on their assessment of practical business experience (Figure 2).

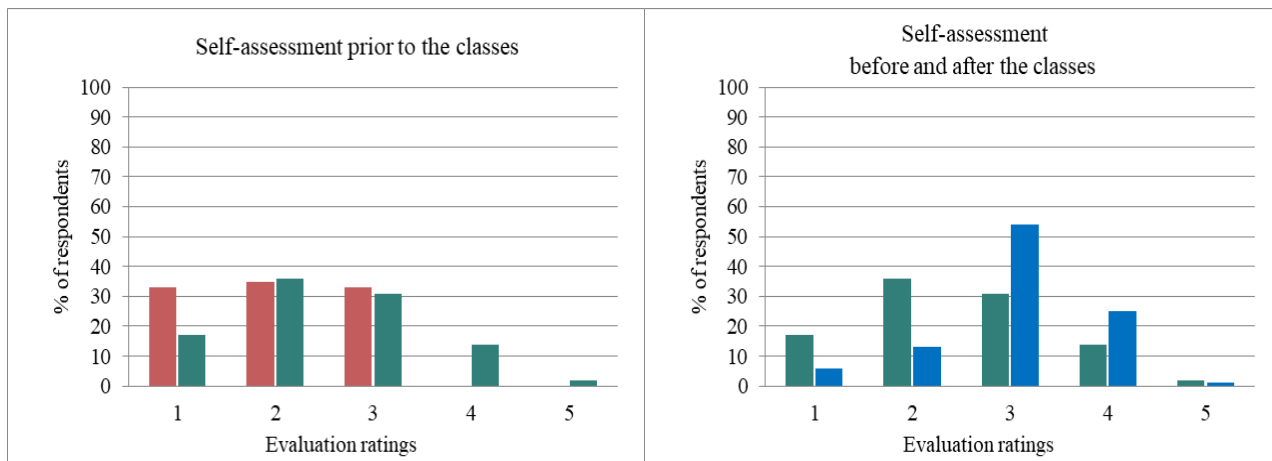


Figure 1: Self-assessment rates of entrepreneurial knowledge. Sixth-semester students before the classes - red; eighth-semester students before the classes - green; eighth-semester students after the classes - blue.

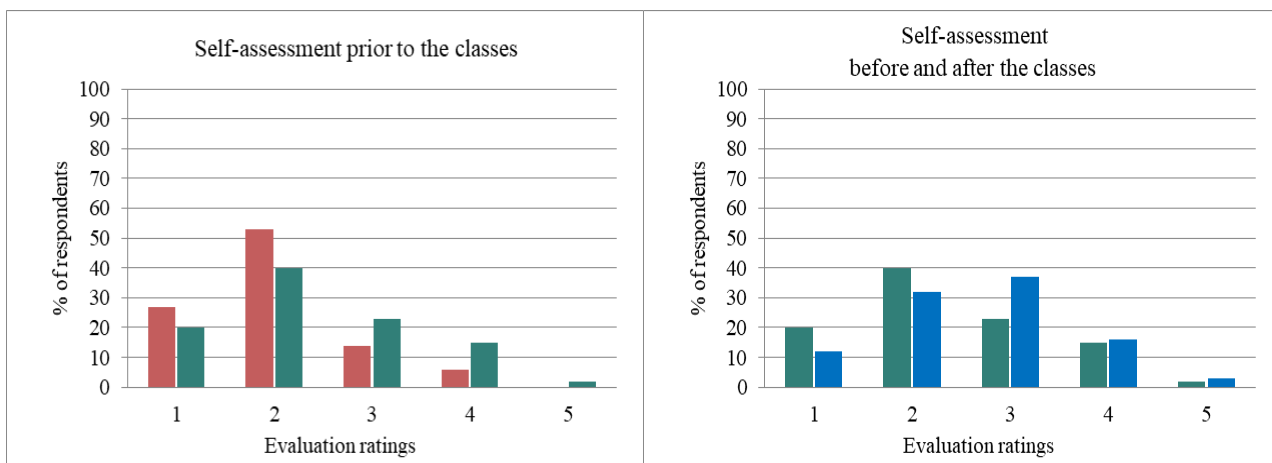


Figure 2: Self-assessment rates of practical business experience. Sixth-semester students before the classes - red; eighth-semester students before the classes - green; eighth-semester students after the classes - blue.

Before the classes a very low self-assessment of business matters among the sixth-semester group has been observed. It applied to both the theoretical knowledge of entrepreneurship (Figure 1) and practical business experience (Figure 2). For the eighth-semester cohort, this indicator was only about 10-15% higher (*good* or *very good* consideration, Figure 1 and Figure 2). This indicates a lack of effective education in this area - during all stages, including university. Moreover, one can observe a noticeably negligible impact of work experience (students' internship) on their awareness of entrepreneurial issues. A possible explanation is that for most of them, this was their first exposure to architectural practice. As a result, they concentrated on acquiring practical architectural skills - design and tools. Participation in the business simulation (eighth semester), resulted in some increase of the entrepreneurial knowledge and experience, especially a drop in *poor* self-assessment could be observed (Figure 1 and Figure 2).

In both groups, about 60% - 70% of the respondents (sixth and eighth semester) described their ability to handle their personal finances as at least good. Neither the six-month student internships nor participation in the EIP classes improved students' perception of their skills in this area. This is understandable, considering these are life skills, valid in particular for all students starting their independent lives, and often in an unfamiliar city.

The state of students' awareness of how important cash flow management is to business presents a similar trend. Nearly 80% of the respondents were aware of this importance, and it slightly increased (5%) after participating in the classes.

The simulation had a significant impact on the actual knowledge of the business issues. Prior to the classes, the level of knowledge of tax rates for project work (Figure 3) and issues related to hiring an employee was at a comparably low level in both groups of respondents. They knew neither the tax rates, nor distinguished between net and gross amounts, and the range of minimum and average salary amounts for graduates hugely varied (from about PLN 1,300 to PLN 7,000). Before the EIP course the correct answers to the relevant questions were given by between 10% and about 50% of the survey participants. At most, only about 10% of the students with professional experience (eight semester) showed better knowledge in this area. However, in some questions the sixth-semester students outperformed the eight-semester ones.

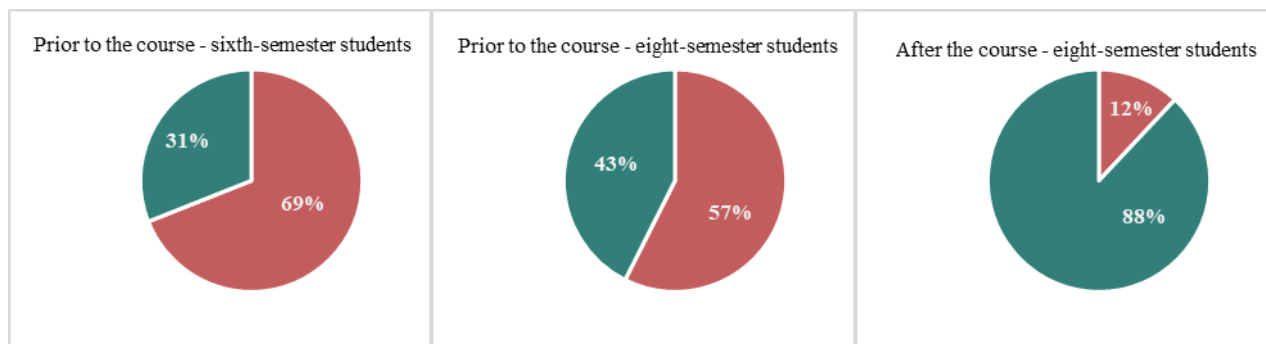


Figure 3: Example assessment of factual entrepreneurial knowledge at different stages of education. Correct responses - green; incorrect responses - red.

The above results confirm students' own perceptions about the low level of their pre-course knowledge. They also indicated that work experience acquired during the internship did not improve their knowledge of economic issues.

The after-course survey results showed a significant increase in the level of correct answers to questions verifying the actual knowledge of entrepreneurship (by about 30-50%, Figure 3 and Figure 4). The increased awareness of salary issues and tax issues that affect salary and employers is evident. In some areas the improvement of students' knowledge is impressive: up to a change in correct answers from 10% to 84%.

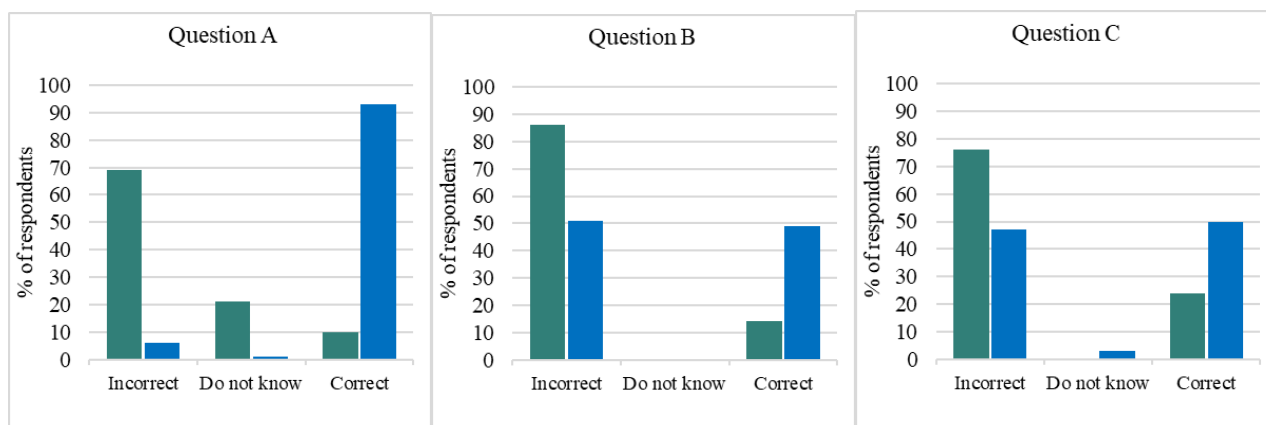


Figure 4: Variations in responses using three fact-checking questions as an example: Question A - related to tax issues arising from hiring an employee; Question B - related to costs generated by hiring an employee; and Question C - related to the amount of the minimum wage in Poland. Eight-semester students before the classes - green; eight-semester students after the classes - blue.

One of the questions was related to the valuation of project work. About 50% of the students in both groups were able to do it correctly even before the course. Participating in the simulation actually decreased this knowledge by 5%. However, few students answered this question in the 2nd questionnaire, and many answers were also clearly random, so the result is not reliable.

The survey also tested students' interest in general economic matters. Sixth-semester students' interest in business development issues both in the national and in the local market was low (20%). Students of the eighth semester declared at least twice as much interest in these issues (about 50% of the respondents - national, and about 40% - local). Participation in the course did not increase this interest. This is probably due to the fact that the conducted simulation hardly depended on the national or local economic situation - students worked on the guidelines set by the instructors.

Students' self-assessment of their interest in legal forms of architectural practice shows that even before the course began, eighth-semester students were more familiar with this subject (Figure 5). In addition, their participation in the business simulation contributed to a highly significant increase in their awareness in the analysed area. As many as 41% more respondents considered their knowledge of the subject to be sufficient (Figure 5).

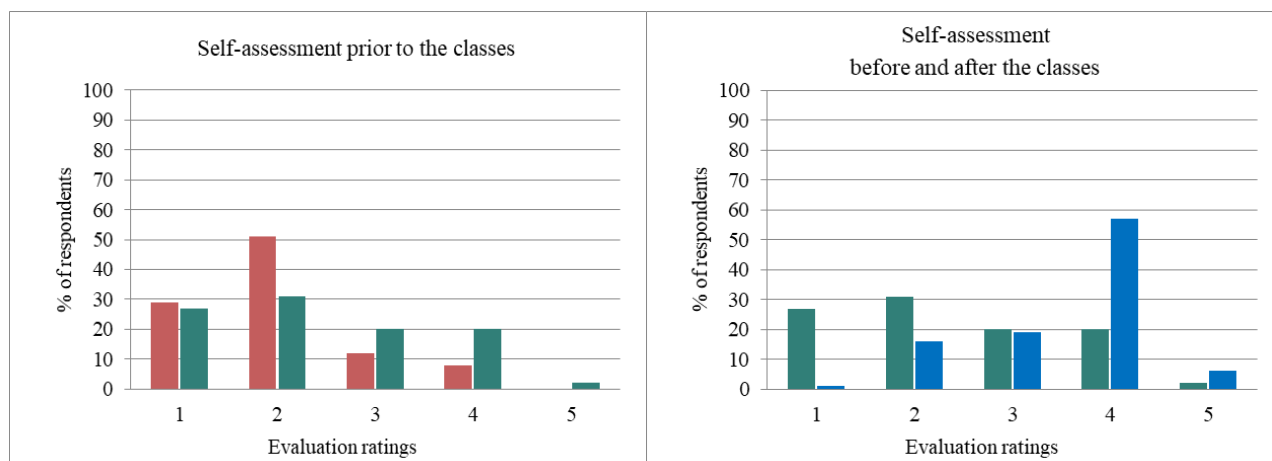


Figure 5: Students' self-assessment of their interest in legal forms of architectural practice. Sixth-semester students before the classes - red; eighth-semester students before the classes - green; eighth-semester students after the classes - blue.

One of the questions aimed to test students' knowledge of the employment market. In this case, respondents from the eighth semester performed significantly better. About half of them were well informed on the subject - they were able to name at least a few names of architectural practices operating on the local market, while only 28% of students from semester six knew any firms of this kind. There is a clear, direct correlation between work experience and knowledge of the architectural market. It is not possible to determine the impact of the business simulation on students' knowledge in this area as only about one third of students answered this question in the post-course questionnaire.

The conducted simulation reinforced the already existing students' understanding of the importance of negotiation skills in professional practice. Before the simulation, more than 90% of the respondents from both groups said negotiations were important or highly important. However, the self-assessment of negotiation skills was low in both groups of students - slightly below 40%. After the classes only 8% of the respondents considered that they had improved in this area.

One question asked respondents to indicate their readiness to start their own business. Prior to taking the EIP course, about 50% of the students in both cohorts declared their eagerness to take this step. Starting their own business as part of the simulation increased this willingness to 60%. This relatively small increase is possibly a combination of new skills acquisition and a reality check during the simulation. Students realised how complicated it is to run their own practice, especially without having relevant professional qualifications from the Chamber of Architects. As a result, it is prudent to gain these qualifications and acquire relevant project experience in an existing practice.

## CONCLUSIONS

The literature on university curriculum (including architecture) identified the following key issues:

- the need for an increased involvement of practising architects in the education process;
- introduction of broader curricula, integrated with non-technical aspects, such as business and law;
- utilisation of active student learning tools.

The design of the simulation offered during the EIP classes was in line with the above requirements, as it was an active learning tool. The simulation introduced students to business and legal issues related to architecture practice and practising architects (not only academics) were involved in running the sessions.

The main advantages of the business simulation were that it:

- enabled students to encounter real business issues usually inaccessible to employees of architectural practice;
- allowed students to learn through experience, which tends to result in more long-lasting learning outcomes;
- forced students to explore the knowledge presented in lectures in order to cope with problem solving;
- required students to find the optimal solution in a simulated real-world problem, thus to apply their knowledge;
- allowed students to acquire the skills to function efficiently in the labour market [18][19].

The simulation had the most significant effect on students' knowledge of general business, financial and legal aspects of running a business (level of wages, cost to the employers, budgeting). In this area the authors observed an increase in

a range between 30 and 80% of correct answers. It was surprising, however, that this increased tangible knowledge did not translate into improved self-assessment of students' entrepreneurial knowledge - this is an area where the EIP lecturers need to enhance their communication with students.

The finding that practice internships did not increase the level of business knowledge and skills was another surprise. It indicates a crucial need for discussion between the University and practices participating in the programme, with a possibility to amend the internship brief.

Based on the questionnaire results, it is clear that students (possibly because of their everyday life) understand the importance of cash flow - there is no need to examine this issue in the future.

An obvious area for improvement in the EIP classes is creating interest in the market environment and building an understanding of local and national market structures among students. A possibility of using visiting lecturers needs to be examined.

In general, the applied business simulation method has improved the employability skills of graduates, in particular with respect to their actual knowledge of practical business skills, including legal, tax and financial issues.

## ACKNOWLEDGEMENTS

The authors would like to thank Professor Rafał Janowicz, the initiator of the business simulation introduced in the EIP module, the main instructor of the class and a practicing architect.

## REFERENCES

1. Frąckowiak, M., *Architektem się Bywa. Raport z Badania Jakościowego Warszawskich Architektów*. Narodowe Centrum Kultury: Warszawa (2018) (in Polish).
2. Knoll, 28 March 2024, <https://www.designalive.pl/agnieszka-kalinowska-soltys-kobieta-u-steru/> (in Polish)
3. Szczepanik-Dzikowski, J., On practicing the architectural profession. The original title: o wykonywaniu zawodu architekta. *Zawód: Architekt*, 30, 6, 26-28 (2012).
4. Czaraczew, B., What can be done to ensure that architectural education meets the expectations of both employers and students? The original title: Co zrobić, aby edukacja architektoniczna spełniała oczekiwania zarówno pracodawców, jak i studentów?, *Zawód: Architekt*, 67, 34-40 (2019).
5. RIBA, *The Strategic Study of the Profession, Clients and Architects*. London: RIBA (1995).
6. Stansfield-Smith, C., *Review of Architecture Education*. London: RIBA (1999).
7. Herrera-Gutiérrez, C., Huamán-Romaní, Y-L., Apaza-Apaza, O., Bravo-Franco, E-Y. and Rodriguez-Peceros, R-I., Entrepreneurial competencies of students from productive technical education centres in Peru. *World Trans. on Engng. and Technol. Educ.*, 20, 3, 170-178 (2022).
8. Bennis, W. and O'Toole, J., How business schools lost their way. *Harvard Business Review*, 83, 5, 96-104 (2005).
9. Barker, B., Employability skills: maintaining relevance in marketing education. *The Marketing Review*, 14, 1, 29-48 (2014).
10. Murray, M. and Langford, D., *Architect's handbook of Construction Project Management*. London: RIBA Enterprises (2005).
11. Cambridge Dictionary, 26 March 2024, <https://dictionary.cambridge.org/dictionary/english/simulation>
12. Edumundo, 26 March 2024, <https://www.edumundo.com/en/business-simulations/explained>
13. Hall, B., Forbes. What are Business Simulations, and how can Companies utilize them effectively? 26 March 2024, <https://www.forbes.com/sites/forbescoachescouncil/2020/10/05/what-are-business-simulations-and-how-can-companies-utilize-them-effectively>
14. Chin, J., Dukes, R. and Gamson, W., Assessment in simulation and gaming: a review of the last 40 years, *Simulation & Gaming*, 40, 4, 553-68 (2009).
15. Musselwhite, C., University Executive Education Gets Real: By Chris Musselwhite University executive education programs are incorporating business simulations into the classroom. *T AND D*, 60, 5, 57 (2006).
16. Mintzberg, H., *Managers not MBAs: a Hard Look at the Soft Practice of Managing and Management Development*. London: Financial Times Prentice Hall (2004).
17. Anderson, P.H. and Lawton, L., Business simulations and cognitive learning. *Simulation & Gaming*, 40, 2, 193-216 (2009).
18. Sulistiyo, E., The effect of career exploration on employability skills, career adaptability and work readiness of Indonesian engineering students moderated by teacher support. *World Trans. on Engng. and Technol. Educ.*, 21, 3, 173-180 (2023).
19. Jaimes Acero, Y.C., Suárez Castrillón, A.M. and Bolívar León, R., Aspects that develop soft skills - a way for inclusion in engineering programmes. *World Trans. on Engng. and Technol. Educ.*, 20, 1, 13-18 (2022).