

## **Developing the Competences of Generation Z with Innovative Teaching Methods in the Context of the Requirement of Labour Market by Industry 4.0**

<https://doi.org/10.3991/ijac.v14i2.24993>

Renáta Machová<sup>(✉)</sup>, Enikő Korcsmáros, Zoltán Šeben, Lilla Fehér, Zsuzsanna Tóth  
J. Selye University, Komárno, Slovakia  
machovar@ujss.sk

**Abstract**—The advent of the fourth Industrial Revolution brings new opportunities, but it also brings risks to entrepreneurs and employees, as well as to education systems and the methods of teaching the present generation. New job opportunities and new forms of work bring demands both from practice and from individual point of view, especially in terms of developing new competences and skills that are usable today. This scientific article is a partial output from the KEGA project 005UJS-4/2019 entitled “Streamlining Managerial Skills of the generations Z and Y by gamification on the context of linking science and practice,” which is solved at the Faculty of Economics of the J. Selye University in Komárno. The current period in which we live is influenced by the rapid growth of knowledge. The established methods and forms of teaching must be changed by the school that prepares the individual to be able to adapt to changing requirements. The impact of scientific and technological progress on education is a societal problem, where the contradiction between the amount of new knowledge in individual fields of science and the educational possibilities of the school has to be addressed. The main aim of our research is to point out the effective use of innovative teaching methods by application of gamification, which leads to the development of new competences in Generation Z that will be easier to apply in the labour market. Key methods of the scientific research are methods of classification analysis, comparison and abstraction in creation theoretical and methodological framework for solving the problem; methods of quantitative analysis with using statistical methods of information processing and evaluation and methods of synthesis; and partial induction in drawing research conclusions.

**Keywords**—innovative teaching methods, gamification, generation Z, labour market, competence

### **1 Introduction**

The current business environment is influenced by modern technologies, which in almost all sectors of the economy enable the automation of production processes, introduction of robotics that partially or completely replace the human labour or help

the implementation of the collection and evaluation of intelligent solutions data. The traditional production process therefore takes on a new dimension. Businesses need to respond to novel technologies and trends if they want to remain competitive and keep up with their competitors. Introduction of new technologies results in creation of new workplaces that require specific skills. Computers and machines can already perform tasks including manual and routine work, while they cannot replace analytical, creative and social skills. This combination makes the individuals perform abstract and non-routine tasks, which are the least endangered by automation. These are mainly the positions of managers and specialists. The availability and quality of work will be an increasingly important issue in the future, so it is necessary to adapt the education and employment policy to new trends and challenges.

Generation Z consists of people born since the mid-1990s. Today, they represent 24% of the population, but so far, only those born before the turn of the millennium are active in the labour market. Despite the fact that Generation Z does not differ much in age from the previous generation, the so-called millennials, preferences and behavior are different, as they are acquainted with digital technologies that have significantly influenced the way they think and communicate.

Gamification can be perceived from different points of view. In this article, we focus on creating a brief overview of the role of gamification in its impact on the vision of the future position of university students in the labour market.

### **1.1 Generation Z and gamification**

It is important to educate open-minded young people, who can make wise decisions and adapt to changes. This can be achieved by a carefully structured and organized education system, and a smooth information transfer within a family [4]. Generation Z as a second digital generation poses a particular challenge for elderly in the field of education and the labour market. The way of thinking, communication and some form of behaviour has changed. The importance of time spent online has increased, and emotional functioning has transformed. It is important not to widen the gap between Generation Z and the rest of the generations. It is crucial to understand the phenomenon in order to make the cooperation successful in school, work and private life. The term generation is used for a group of people born in the same era, influenced by the same societal issues, and therefore connected by similar living conditions, technology or experience [6]. Generation Z is formed by individuals born in the period of 1995–2009. Different terms are used to define this generation—e.g., net generation and digital natives [1]. They are the first global generation, who were entirely born into the world determined by different digital technologies. They use the web to access and consume information. They are accustomed to being in contact with each other and have a constant and instant access to the Internet. The life of Generation Z was also determined by significant events—e.g., terrorist attacks, which started on September 11, 2001, with an attack on the Twin Towers in New York. These served as a basis for war against terrorism and the global unrest between East and West. One of the characteristic features of Generation Z is that they

have been surrounded by technology since their childhood—e.g., laptops, tablets, smartphones, iPhone, and iPads. Technological development is not the only factor that has influenced this generation [1]. A group of individuals born between 1980 and 1994 is referred to as Generation Y. This generation is also called “Echo Generation”, “Nintendo Generation” or “Nexters”. Generation Y is referred to those who were brought up on the Internet, electronic devices, and social media sites. According to DMR (Digital Marketing Ramblings), the representatives of this generation spend 18 hours on their smartphones weekly. This generation is more likely to be influenced by the Internet than the TV.

According to Fromann [2], the anthropology of Homo Oeconomicus has banished play as a valuable human activity, since play is not a serious activity and does not bring economic benefit. At the dawn of the digital age, the notion of Homo Ludens returned, who is capable for not only influencing his behaviour but also increasing his subjective well-being. In the last few decades, a tendency can be observed, when not only the scientific research, but also the different sectors (marketing, education, politics, healthcare, etc.) has turned to the world of game. Play has many forms of occurrence. If the term “play” occurs, we usually associate it with a joyful activity that makes us relaxed. Experiencing positive emotions is a high-level motivator for the individual. Gamification is applying game-like elements in a non-game environment in order to increase engagement, the user experience, the level of loyalty and joy [10]. These components act as motivational mechanisms. The play serves our needs to experience joy and excitement [8, 9]. Thus, gamification targets the individual’s motivational system in a complex way, using different initiatives and rewards.

## **1.2 Industry 4.0**

Industry 4.0 refers to the fourth digital and industrial revolution, highlighting the increasing connectivity of information technology and automation, as well as the fundamental change of production methods. The question is how the process affects the economy and the employees. The Industry 4.0 is based on digitalization, where data and a computer are the necessary tools to make it function. The Internet and the technological development create the network of individuals, machines and businesses. Sharing the data of value-creating processes makes available the production of competitive and customized products. The various machines and systems—even the products themselves—provide data (see Figure 1). The storage, processing and interpretation of these data represent huge challenges. The source of competitive advantage is not only the coordinated or the completely new production system (e.g., additive production), but also enhancing the products with digital services, as well as how these businesses filter relevant information to support their decision-making based on collected data.

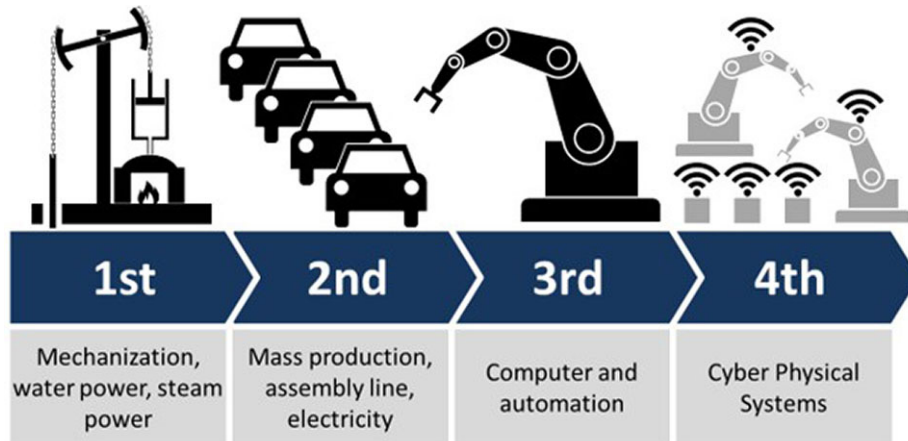


Fig. 1. Development of industrial revolutions

The latest industrial revolution is about integration of machines and objects into a single information network, as well as integration of the real economy into a single, intelligent information system [7]. The presence of the Internet of Things—smart devices, smart homes—is not an extraordinary phenomenon for the average user. However, for those involved in industrial production, the new perspectives of networking and digitalization become clear and visible in the present. It will fundamentally change the production structure and the relationship to supplier, sellers and the customer. The connection of industrial systems, business models and tools to a communication system (Internet of Things), and the concept of automatic decision-making power, is called Industry 4.0 by the engineers, economists and lawyers [3].

A crucial point of the automatic decision-making power is the independent learning ability of the machines. It requires an amount of incomprehensible data. Big Data is a term used to describe a huge amount of data processed during a day. All data and information created by the private sector, public sector, businesses and individual users can be considered a part of Big Data. Based on IBM data, 2.5 exabit data are produced on daily basis—this is a number followed by 18 zeros and equivalent to 2.5 trillion bit.

## 2 Research methods

The aim of the present research is to assess the development of Generation Z competencies applying innovative educational methods in the era of Industry 4.0, and these competencies will be essential when entering the labour market. In the rapidly changing era of the 21st century, both the employers and the employees face new challenges. The employer has to be aware of these requirements in order to motivate the employee and increase the employee efficiency. Although financial benefits are important, there are further motivational tools to be applied at workplaces. In order to achieve the outlined research objective, the following research question was formulated:

Are students who have already encountered alternative education methods during their primary and secondary education more aware of their vision and position in the labour market?

In order to answer the research question, inferential statistics were used as a primary research method, since the main objective of our research was to examine the relationship between the factors. Descriptive, cross-sectional research was found useful to achieve our objectives [5]. The questionnaire survey applied in the empirical part of this work was completed with a help of simulation software. The questionnaires were completed anonymously in October 2019. As a non-random sampling technique, evaluative sampling was applied in the research, where the elements are selected based on the researcher's decision. Prior to the use of the simulation software, our questionnaire was completed by a total of 256 students, where 44% of the respondents represent Generation Y and 56% represented Generation Z. After checking the collected data, the necessary statistical procedures were chosen, using the SPSS programmer package.

The main objective of conducting univariate analysis was to get insights into our collected data. It helps to determine how and how many questions were answered in the questionnaire survey. Performing univariate analysis is important for the researchers, as it serves as a basis for conducting multivariate analysis later. The indicators in univariate analysis fall into four groups: position, standard deviation, shape and other indicators. In our analysis, we mainly used the position indicators (mean, mode) and the scattering indices (standard deviation). Deeper analysis of the obtained data required multivariate analysis methods—variance and cluster analysis.

### **3 Results of the research**

To assess the respondents' experience with teaching methods, we examined whether our students have experience with education process of other institutions of higher education. According to the answers, almost 20% of our respondents have experience with teaching methods of other universities; the majority of the students gained experience at Corvinus University in Budapest, Széchenyi István University in Győr and Constantine the Philosopher University in Nitra. The respondents spent shorter and longer periods studying at these universities as exchange students.

In the following, we will move on to an analysis necessary to answer the first research question. Our first research question was: Are students who have already encountered alternative education methods during their primary and secondary education more aware of their vision and position in the labour market? The respondents had to answer two questions to provide a satisfactory answer. First, the respondents were asked if they had already encountered any form of alternative methods of education during their primary, secondary and university studies. Based on the obtained research data, we can assume that the classical methods applied in education based on providing theoretical knowledge—calculation tasks at the board, written tests, homework—were reported with almost 100% occurrence at all levels of education. Significant differences we can detect in the case of oral exam as one of the classical teaching methods. Oral exam is mainly encountered by secondary school students. It is not surprising, since vocational schools are attended by a lower number of students per classroom, allowing teachers

to conduct oral exams. In primary school education, both the age of the pupils and the number of students in the classroom limits the possibility to practice oral exams. In the case of factory visits, applying special software in the education process was dominant in secondary school education, which can be explained by the importance of professional knowledge transfer to students. Regarding the other teaching methods observed, we can assess that, progressing in different stages of the educational system, the frequency of applying different methods of education has increased. The case studies, situation games, group activities, individual oral presentations, presentations provided by professionals, computer-based tests, PPT presentations, essays, Internet-based lessons, interactive whiteboards and simulation software (SmartSim) are mainly applied in university education. The occurrence of the above mentioned is limited in primary school education. The use of simulation software is even less widespread in the Slovak education system. The frequency of use in primary education is close to zero; in secondary and tertiary education, the application of simulation software reached only 20%.

Our next question targeted the labour market consciousness of the respondents, where a scale of 1 to 5 (1, not characteristic at all; 5, absolutely characteristic) was used by the respondents to express their opinion about finishing their university studies. First of all, the frequency distributions from the univariate analyses were considered. As a first step, we examined the distribution of answers regarding the 15 factors by using mean, mode and standard deviation indicators.

**Table 1.** Labour market consciousness of the respondents

Factors	Mean	Modus	Standard Deviation
My future position should ensure financial stability.	4.2	5	0.96
I like being a university student.	4.2	5	0.80
Obtaining a degree is my ambition. It is a motivation factor in my studies.	3.9	4	0.99
I study to obtain in-depth knowledge.	3.9	4	0.86
I am motivated to learn outside the classroom environment as well.	3.9	5	1.01
I am interested in and have willingness to participate in education process applying alternative methods.	3.7	4	1.00
Performing different types of tasks is not a problem.	3.7	5	1.15
I like studying at university.	3.7	4	1.12
I am dedicated to enter my future career.	3.4	3	1.07
I feel motivated and active on the seminars.	3.2	3	0.94
I have always been interested in this field of study.	3.1	3	1.08
I do not feel satisfactory to pass the exams with minimum.	3.0	3	1.23
I like take on extra curriculum.	2.2	1	1.06
Partying is the most essential aspect of my university years.	2.2	1	1.20
I am not interested in the chosen field of study.	1.9	1	1.09

Source: Own editing based on the results of the questionnaire survey

Table 1 presents that the most important factor for the respondents is ensuring financial stability by finding the appropriate job after obtaining a university degree (4.2). They also like the university life, being students in tertiary education (4.2). Our respondents are mainly characterized by being conscious individuals, since obtaining their university degree is a priority, as well as the transparent, in-depth knowledge and self-development. They are open to experience alternative teaching methods, they are challenged by completing different types of tasks, they love learning and they feel motivated and committed to their future career. However, the table shows that the standard deviation of the statements is different, where the value differs from 1. It means that our students do not represent a unified standpoint regarding the statements. However, the table shows that the value of standard deviation differs from value 1, which means that our students do not have a unified opinion regarding the statements. Unified opinion, however, was expressed regarding the alternative methods of education.

In order to answer our first research question, we conducted a variance analysis to determine if there was a difference in labour market awareness of the respondents depending on whether they had already encountered alternative methods of teaching during their primary and secondary school studies. Nine out of 15 statements clearly express the students' awareness, so our further analysis will focus on these 9 statements. Examining the conditions of the variance analysis, it is true that our dependent variables were measured on an interval scale. The results of the normality tests, the Kolmogorov-Smirnov and Shapiro-Wilk tests, also show a normal distribution of variables. The Levene's test was used to test the homogeneity of variances. After running the test in the programme, we obtained the result that the condition of standard deviation homogeneity is not fulfilled in the case of three statements: the desire to acquire a thorough knowledge, the need to perform various tasks and the knowledge obtained beyond traditional classroom activities. The variance analysis cannot be applied in the cases mentioned above. Following the analysis described and performed above, the ANOVA table was prepared including 6 statements (Table 2).

**Table 2.** ANOVA-table on labour market awareness in terms of alternative education

Factor	F	Sign.
I have always wanted to gain knowledge in this field of study.	0.179	0.673
I feel dedicated to my future career.	0.031	0.859
It is not satisfactory to pass my exams with minimum points achieved.	12.71	0
I am motivated and active on lessons.	6.601	0.011
I like to be involved in alternative methods of teaching.	7.122	0.008
I show willingness to improve my knowledge beyond my university studies.	0	0.984

Source: Own editing based on questionnaire survey

The conducted research analysis shows that, considering the significance levels, students experiencing and those not experiencing alternative methods of teaching earlier, expressed different level of importance to pass exams with minimum points, active participation on lessons and the alternative methods of teaching. In commitment



to the chosen field of study, dedication to future career and improving knowledge beyond university studies were experienced by different groups of respondents the same way. It can be stated that, only in the case of 3 out of 9 awareness factors, the role of encountering alternative methods of teaching was relevant.

Since it is part of an ongoing project, analysis of the obtained results is in progress. The present study reflects partial results of the analysis of the collected data. The pandemic has affected all areas of citizens' lives and has radically changed the way we learn from day to day. With the exception of Sweden, schools were closed in all EU countries. Full-time teaching was interrupted at all universities in the EU. In the future, we plan to make a comparison between non-traditional educational methods for students and other generations.

## **4 Discussions**

Growing current global trends in the field of melding effective working environment aim to develop the working environment in such a way as to contribute to the effective development of the individual. The interrelationship between the competences of the worker and their direct impact on the individual can be generally defined as basic competencies—e.g., knowledge, skills, habits and attitudes. Implemented research aimed at analysing the formulation of the labour market shows that it is, in many cases, more important how competencies are developed compared with competences themselves. It follows that universities play a key role that focuses on the development of oral competencies and written communication, critical thinking, problem solving and teamwork. Higher education should meet market requirements. Compared to this idea, when compiling study programs, the fact is that often works without structured data and systematic market research, which are rather replaced by imitations of successful ones and validated models, especially from abroad, and the actual result is presented with indistinct parameters. Analysis of existing procedures and information from the developed countries of the world shows that, as in other areas, there is no best measure in the field of higher education. In summarizing the strengths and weaknesses of Generation Z managers in accordance with the five sets of managerial thinking, we have to find that, in improving the quality of higher education, managers should not forget to improve the reflection of Generation Z graduates to be aware of their strengths and weaknesses, skills and competences; without self-knowledge, it is impossible to penetrate into the depths of the problem. It would also be appropriate for graduates of this generation to streamline analysis skills and direct attention to contextual perception not only of the problem, but also the impacts of their solutions.

## **5 Acknowledgment**

The scientific article is a partial output from the KEGA project 005UJS-4/2019 entitled “Streamlining Managerial Skills of the Generations Z and Y by gamification in the context of Science and Practice,” which is solved at the Faculty of Economics and Informatics of the J. Selye University in Komárno.



## 6 References

- [1] Berkup, S. B. (2014). Working With Generations X and Y in Generation Z Period: Management of Different Generations in Business Life. *Mediterranean Journal of Social Sciences*, 5(19), p. 218. Retrieved from <http://www.richtmann.org/journal/index.php/mjss/article/view/4247>; <https://doi.org/10.5901/mjss.2014.v5n19p218>
- [2] Fromann, R. (2012). Gamification—épülőben a Homo Ludens társadalma? In E. Nagy (Ed.), *A fiatal kutatók Magyarország megújulásáért—A Professzorok az Európai Magyarországiért Egyesület III. PhD. Konferenciája*, pp. 11–24.
- [3] Hecklau, F., Gailetzke, M., Flachs, S., Kohl, H. (2016). 6th CLF—6th CIRP Conference on Learning Factories. *Procedia CIRP* 54, pp. 1–6. <https://doi.org/10.1016/j.procir.2016.05.102>
- [4] Horváthová, K., Szókö, I. (2013). Funkcie a dimenzie pedagogického hodnotenia. *Eruditio – Educatio*. Vol. 8, n. 2, pp. 71–84. ISSN 1336–8893.
- [5] Malhotra, N. K. (2013). *Review of marketing research*. Emerald Publishing, ISBN 978-1781907603, pp. 306. [https://doi.org/10.1108/S1548-6435\(2013\)10](https://doi.org/10.1108/S1548-6435(2013)10)
- [6] McCrindle, M., Wolfinger, E. (2010). Az XYZ ábécéje. A nemzedékek meghatározása <[http://korunk.org/letoltlapok/Z\\_RKorunk2010november.pdf](http://korunk.org/letoltlapok/Z_RKorunk2010november.pdf)> (Retrieved: 2020 May 6th. 22.54).
- [7] Schmidt, R., Möhring, M., Härting, R. C., Reichstein, C., Neumaier, P., Jozinović, P. (2015). Industry 4.0—potentials for creating smart products: Empirical research results. In: Abramowicz, W. (eds), *Business Information Systems. BIS 2015. Lecture Notes in Business Information Processing*, Vol. 208. Springer. [https://doi.org/10.1007/978-3-319-19027-3\\_2](https://doi.org/10.1007/978-3-319-19027-3_2)
- [8] Szarka, K. (2017). *Súčasné trendy školského hodnotenia: Koncepcia rozvíjajúceho hodnotenia*. 1. ed. Komárom: Kompress, pp. 147. ISBN 978-963-12-9692-1.
- [9] Szókö, I., Albert, S. (2009). Development of key competencies and ICT teaching at UJS in Komarno. In: *Trends in Education 2009: Information Technologies and Technical Education*. Olomouc: Palacky University, Vol. 1–2 (2009), pp. 370–374. ISBN 978-80-7220-316-1.
- [10] Werbach, K., Hunter, D. (2012). For the win: how game thinking can revolutionize your business, pp. 149. <https://doi.org/10.1017/CBO9781107415324.004>

## 7 Authors

**Dr. habil Ing. Renáta Machová, Ph.D.** Associate Professor from The Department of Management, Faculty of Economics and Informatics, J. Selye University, Hradná 167/21, P.O. Box 54, Komárno, Slovakia, [machovar@ujs.sk](mailto:machovar@ujs.sk). Long-time expert from practice in the area of entrepreneurship and employment policy, in the context of small and medium-sized enterprises. Expert with experience in the business sphere enabling the theoretical knowledge to be actively coupled with practical skills of future managers. Actually, she focuses on the exploration of different habits of different generations. ORCID ID [0000-0002-7817-0187](https://orcid.org/0000-0002-7817-0187)

**PhDr. Enikő Korcsmáros, Ph.D.** is a Head of The Department of Economics, Faculty of Economics and Informatics, J. Selye University, Hradná 167/21, P.O. Box 54, Komárno, Slovakia, [korcsmarose@ujs.sk](mailto:korcsmarose@ujs.sk). She has published several research papers in national and international journals. ORCID ID [0000-0002-2026-8712](https://orcid.org/0000-0002-2026-8712)

**Ing. Zoltán Šeben, Ph.D.** is a Head of The Department of Management, Faculty of Economics and Informatics, J. Selye University, Hradná 167/21, P.O. Box 54, Komárno,

Slovakia, [sebenz@ujs.sk](mailto:sebenz@ujs.sk). He has published several research papers in journals such as Marketing and Management of Innovations. ORCID ID [0000-0002-7836-4125](https://orcid.org/0000-0002-7836-4125)

**Mgr. Lilla Fehér** is an assistant lecturer at the Faculty of Economics and Informatics J. Selye University, Hradná 167/21, P.O. Box 54, Komárno, Slovakia, [feherl@ujs.sk](mailto:feherl@ujs.sk). She teaches German language in the Faculty of Economics and Informatics. She has published several research papers in national and international journals. ORCID ID [0000-0001-5035-4657](https://orcid.org/0000-0001-5035-4657)

**Mgr. Zsuzsanna Tóth, Ph.D.** is a Senior Lecturer at the Faculty of Economics and Informatics, J. Selye University, Hradná 167/21, P.O. Box 54., 94501 Komárno, Slovakia, [tothz@ujs.sk](mailto:tothz@ujs.sk). She holds a Ph.D. in Economic Sciences from J. Selye University and has published in journals such as Acta Polytechnica Hungarica. ORCID ID [0000-0002-1309-9308](https://orcid.org/0000-0002-1309-9308)

Article submitted 2021-06-22. Resubmitted 2021-09-27. Final acceptance 2021-10-05. Final version published as submitted by the authors.