



Alexander Dubček University of Trenčín  
Faculty of Social and Economic Relations



Proceedings of scientific papers from the international scientific conference

# Challenges, Trends, and Inspirations in Education - CTIE

March 23<sup>rd</sup> - March 24<sup>th</sup>, 2026

Hotel Hills \*\*\*\*, Stará Lesná



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**Hotel Hills \*\*\*\*, Stará Lesná 153, 059 60 Stará  
Lesná**

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• **Visegrad Fund**

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**2026**

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### **About the Conference:**

The international scientific conference seeks to foster collaboration among eight partner institutions from different countries and to connect academics, doctoral students, early-career researchers, and practitioners. It will provide space for comparing the situation across the region, engaging in expert discussion, and identifying shared innovative solutions.

The international scientific conference will enable the presentation of international research results, empirical data, examples of good practice, and modern pedagogical approaches that may contribute to the modernization of education, increased capacity within the university environment, and better alignment of educational systems with the needs of Generation Z. At the same time, it will create conditions for networking, linking research teams, developing further cooperation, and supporting the formulation of evidence-based strategic recommendations for education policymakers in the V4 countries.

### **The main objective of the international scientific conference:**

The main objective of the international scientific conference is to establish a professional platform for international exchange of knowledge, research findings, and best practices in the education of Generation Z, with a particular focus on addressing the capacity crisis and outdated educational methods in the V4 countries.

## Program of conference:

### 23rd March 2026

10:00 - 11:30 Registration

11:30 - 12:30 Lunch

12:30 - 13:00 Opening ceremony and welcome to guests, introduction of speakers

13:00 - 14:00 Differences in the value orientation of Generation Z in the V4 countries

**(Mgr. Bc. Ondřej Pavelek, Ph.D. - Mendel University in Brno)**

14:00 - 15:00 Educational Trends in the V4 Region: Expectations of Generation Z

**(dr. Anikó Csepregi - University of Pannonia in Veszprém)**

15:00 - 15:30 Break

15:30 - 16:30 Use of new methods of education in relation to Generation Z

**(PhDr. Alloys Daněk, Ph.D., PhDr. Anna Frombergerová, Ph.D. - AMBIS University in Prague)**

16:30 - 17:30 Future-Proofing Education: Insights from Generation Z's Expectations and Regional Capacities

**(Ing. Eva Hoke, Ph.D - Tomas Bata University in Zlín)**

18:00 - 19:00 Dinner

19:00 - 22:00 Social programme

### 24th March 2026

07:30 - 08:30 Breakfast

09:00 - 11:30 Breakout sessions

11:30 - 12:30 Lunch

12:30 - 15:00 Breakout sessions

(Session titles: Innovations in Education for Generation Z; Adapting the Educational System for the Future; Regional Challenges in Ensuring Educational Capacities).

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## INTRODUCTION

Dear colleagues, dear conference participants,

You are holding in your hands a peer-reviewed scientific proceedings of the international conference *"How Generation Z Perceives Access to Education and Capacities in the V4 Region"*, organized as part of the project **"How Generation Z Perceives Access to Education and Capacities in the V4 Region"** (V4 No. 22430220) with the support of the International Visegrad Fund.

This proceedings is the result of intensive international cooperation between partners from all Visegrad Group countries. The project was implemented as an international research initiative aimed at creating a space for professional discussion and comparative analysis of issues related to Generation Z's access to education, the development of individual capacities, and their readiness to respond to the changing demands of society and the labor market in the V4 countries.

The theme of the conference reflects the current social, economic, and educational challenges facing the younger generation in the dynamically changing reality of the Central European region. Generation Z represents a significant group entering the academic and professional environment in a period characterized by digitalization, globalization, technological changes, but also new forms of social and economic inequalities. That is why examining their perception of access to education and opportunities for skills development is particularly relevant for the future of the V4 region.

One of the main objectives of the project was to create a platform for the exchange of experiences, the presentation of empirical research results, and the deepening of academic cooperation between V4 institutions. The published contributions included in this collection have undergone a review process and represent the results of scientific data processing, analytical approaches, and comparative research perspectives. Their common denominator is the effort to identify factors influencing young people's perception of educational opportunities and to formulate recommendations for supporting the development of their potential in the V4 region.

The project is significant not only in terms of international cooperation, but also in terms of the creation of scientific outputs based on empirical data and systematic research. The successful networking of partners from the V4 countries confirms that issues of education and development of the younger generation transcend national frameworks and require a

coordinated and comparative scientific approach. The support of the International Visegrad Fund has made it possible to carry out this international research, strengthen academic partnerships, and publish its results in the form of a professional collection that can serve as a stimulus for further research activities and public policy-making.

We believe that this proceedings will contribute to the development of scientific discourse in the field of education, youth policies, and regional cooperation in the V4 countries. At the same time, it represents a starting point for further scientific processing of the knowledge gained, which will also be developed through subsequent publications in professional and internationally recognized scientific journals. In this sense, the conference and the collection form the basis for continuing research and further deepening academic cooperation within the Visegrad Group. The collection is intended for a wide professional audience, and we believe that it will contribute to the development of further interdisciplinary research initiatives.

We would like to thank all the authors for their professional contributions, the reviewers for their high-quality assessment of the contributions, and the project partners for their active cooperation in organizing the conference and preparing this collection.

On behalf of the organizing team

**Assoc. Prof. Ing. Adriana Grenčíková, PhD.**

## PERCEIVED BARRIERS AND OPPORTUNITIES FOR IMPROVING THE PERFORMANCE OF GENERATION Z

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**Abstract:** *This paper examines the perceived barriers and opportunities affecting the performance of Generation Z in the context of higher education. The primary objective of the study was to identify key external and internal factors that limit students' effectiveness, as well as the most common reasons for procrastination in fulfilling academic tasks. A qualitative research approach was employed, involving 32 Generation Z students enrolled in a university course focused on the development of managerial skills. Data were collected through self-reflection and categorization of perceived sources of inefficiency and time loss. The results indicate that students' performance is negatively influenced mainly by time losses related to commuting and waiting, excessive use of social media, procrastination, and insufficient self-regulation. At the same time, the findings revealed that students are able to identify specific opportunities to improve their performance, particularly through better time management, goal setting, reduction of digital distractions, and more effective organization of study-related activities. The results emphasize the importance of flexible, interactive, and supportive educational environments that promote student engagement, well-being, and the development of self-regulatory skills in Generation Z.*

**Key words:** *barriers, Generation Z, opportunities, performance, procrastination*

**JEL Classification:** *I21, I23, I31*

### 1. INTRODUCTION AND THEORETICAL BACKGROUND

Generational differences in the approach to work, study and performance currently represent a significant challenge for educational institutions and organizations. Young people from Generation Z have different expectations from life and work than older generations and approach their responsibilities differently. Traditional approaches to performance

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management, motivation and organization of work or study therefore often cease to be effective. Understanding the factors that influence the performance of Generation Z, as well as identifying obstacles and opportunities for its improvement, are becoming a key prerequisite for creating effective educational and management strategies.

Generation Z, which includes individuals born since 1995, is entering the education system and the labour market at a time of significant technological, social and economic change. They grew up in a digital environment that fundamentally shaped their values, behaviour, approach to responsibilities, and expectations of schools and employers. The performance of Generation Z cannot therefore be assessed in isolation, but in the context of technological adaptation, psychological well-being, motivation, flexibility of work and study environments, and broader social factors (Kozová et al., 2025). The approach to duties is characterized by a high degree of pragmatism and meaningfulness. Young people from this generation are willing to perform well when they understand the meaning of tasks, see their impact and feel that their work or studies have value. Unlike previous generations, they place less emphasis on formal authority and more on a partnership approach, feedback and autonomy. In both work and study environments, Generation Z prefers clearly defined goals, flexible forms of fulfilling duties and the ability to organize their time according to their own needs. For them, performance is not only a question of quantity, but especially of quality, balance and psychological well-being. If they are exposed to rigid rules, unclear communication or undue pressure, their performance can decline significantly (Araújo et al., 2025). Generation Z achieves different results in their studies depending on the type of educational environment. In systems that support interactivity, digital tools, project-based learning and the connection of theory with practice, they show a high level of engagement and good study results. On the contrary, traditional frontal teaching without space for discussion and independence often leads to a decrease in motivation. It is typical for this generation to continuously verify the meaning of their studies in terms of future application. They prioritize practical skills, development of competencies and opportunities for further growth over memorization of facts. Study performance is closely linked to intrinsic motivation, psychological state and ability to cope with stress, which is also reflected in the fluctuation of results during more demanding periods (Czerwińska-Lubszczyk et al., 2025). One of the most striking characteristics of Generation Z is their high level of technological proficiency. Regular use of digital technologies, online platforms and collaboration tools comes naturally to them and significantly affects their performance and satisfaction. They see technology as a means of efficiency, flexibility and fast communication. In the work environment, Generation Z values digital leadership – managers and leaders who understand technology, can lead remote teams and support open,

transparent communication. Digitally competent leadership has a proven positive impact on the engagement, trust and performance of this generation. At the same time, technology alone does not guarantee performance; what is crucial is how it is implemented and whether it supports collaboration and knowledge sharing (Lazaridis, 2025). Generation Z clearly prefers flexible and hybrid forms of work and study. The ability to work from home, flexible working hours and autonomy in decision-making are key factors in their satisfaction and willingness to stay in an organization or educational institution. Balance between work, study and personal life is among their highest priorities. An environment that supports personal development, lifelong learning and psychological well-being has a direct impact on the performance of Generation Z. If they feel safe, supported and treated fairly, they can perform at a high level in the long term. Conversely, environments that ignore individual needs lead to demotivation and increased turnover (Jacobs et al., 2025). The main priorities of Generation Z include personal development, meaningful work, mental health and ethical values. This generation is more sensitive to issues of environmental responsibility, diversity and social justice. They expect employers and institutions to act in accordance with their declared values and to offer not only financial but also intrinsic rewards, such as recognition, opportunities for growth and self-fulfilment. Financial rewards are important, but not enough on their own. Feedback, a sense of purpose and the opportunity to influence their own path play a significant role. These factors are directly related to their performance at work and in their studies (Kozová et al., 2025). Despite their high potential, Generation Z faces several obstacles that negatively affect their performance. The most significant are psychological and social factors, such as increased levels of stress, anxiety, loneliness and perfectionism. Constant pressure to perform, comparisons through social networks and uncertainty about the future can lead to a decline in mental health. Another challenge is the mismatch between Generation Z's expectations and the reality of traditional organizational and educational structures. Lack of flexibility, poor communication and limited development opportunities often lead to frustration and lower engagement. Generation Z's performance is therefore very sensitive to the quality of leadership, interpersonal relationships and support from institutions (Jacobs et al., 2025).

The article is focused on analysing perceived barriers to generation Z performance and on identifying opportunities to support it in the context of higher education. The article presents the results of a study examining generation Z performance during their studies.

## **2. PROBLEM FORMULATION AND METHODOLOGY**

The aim of the presented study was to examine the sources of performance barriers for Generation Z and the most common reasons for procrastination. To achieve the stated aim, three research questions (RQs) were formulated.

**RQ1: How do members of Generation Z perceive barriers to achieving desired performance?**

**RQ2: What are the most common reasons for procrastination for Generation Z?**

**RQ3: What opportunities can members of Generation Z identify to improve their performance?**

To answer the research questions, we decided to use a qualitative approach. We chose a qualitative approach because the performance of Generation Z, as well as other generations, is significantly influenced by subjective experiences, motivation, emotions, and individual experiences. A qualitative approach allows us to understand how participants themselves interpret performance barriers, not just how often they occur. Measurable indicators allow us to have an overview of the achieved performance, but they do not reveal the causes of inefficiency and barriers to achieving the desired results. Therefore, we chose a qualitative research approach, which allows us to understand more deeply the subjective perception of performance barriers and reasons for procrastination among members of Generation Z. Qualitative techniques also allow us to capture contextual and individual factors that cannot be sufficiently captured by quantitative methods.

For the purposes of the qualitative study, we selected a sample of students in a course focused on the development of management skills. The reason for choosing students specifically in this course was that it is not a profiling professional course and is taken by students from various fields of study, which increased the probability of random selection of the research sample. A total of 32 participants, first-year students of the second level of university studies, participated in the study.

### **3. RESULTS AND DISCUSSION**

After the study was completed, the academic results of the students from the course focused on developing managerial skills were analysed. Given that their attendance at lectures for this course is voluntary, it can be stated that the students participating in the study are sufficiently motivated and interested in achieving good academic results. Table 1 shows the structure of the participants, as well as the overall results achieved, in comparison with their ongoing performance, their activity in exercises, and their attendance at lectures. AF represents absolute frequencies and RF represents relative frequencies in %.

**Table 1: Results achieved from the analysed course**

Student characteristics / Exam evaluation	A		B		C		Sum	
	AF	RF [%]	AF	RF [%]	AF	RF [%]	AF	RF [%]
<b>Gender</b>								
Female	12	37.50	1	3.13	1	3.13	14	43.75
Male	7	21.88	8	25.00	3	9.38	18	56.25
Sum	19	59.38	9	28.13	4	12.50	32	100.00
<b>Study programme</b>								
Applied Informatics and Automation in Industry	5	15.63	4	12.50	1	3.13	10	31.25
Integrated Safety	2	6.25	3	9.38	1	3.13	6	18.75
Industrial Management	5	15.63	1	3.13	1	3.13	7	21.88
Personnel Policy in Industrial Plant	4	12.50	0	0.00	1	3.13	5	15.63
Production Technologies and Production Management	3	9.38	1	3.13	0	0.00	4	12.50
Sum	19	59.38	9	28.13	4	12.50	32	100.00
<b>Activity during seminars</b>								
Active	4	12.50	1	3.13	0	0.00	5	15.63
Inactive	0	0.00	1	3.13	0	0.00	1	3.13
Average	15	46.88	7	21.88	4	12.50	26	81.25
Sum	19	59.38	9	28.13	4	12.50	32	100.00
<b>Lecture attendance</b>								
Less than half	1	3.13	3	9.38	2	6.25	6	18.75
More than half	18	56.25	6	18.75	2	6.25	26	81.25
Sum	19	59.38	9	28.13	4	12.50	32	100.00
<b>Points scored in the interim evaluation</b>								
<15	0	0.00	0	0.00	1	3.13	1	3.13
15 - 18.5	9	28.13	5	15.63	2	6.25	16	50.00
19 - 20	10	31.25	4	12.50	1	3.13	15	46.88
Sum	19	59.38	9	28.13	4	12.50	32	100.00

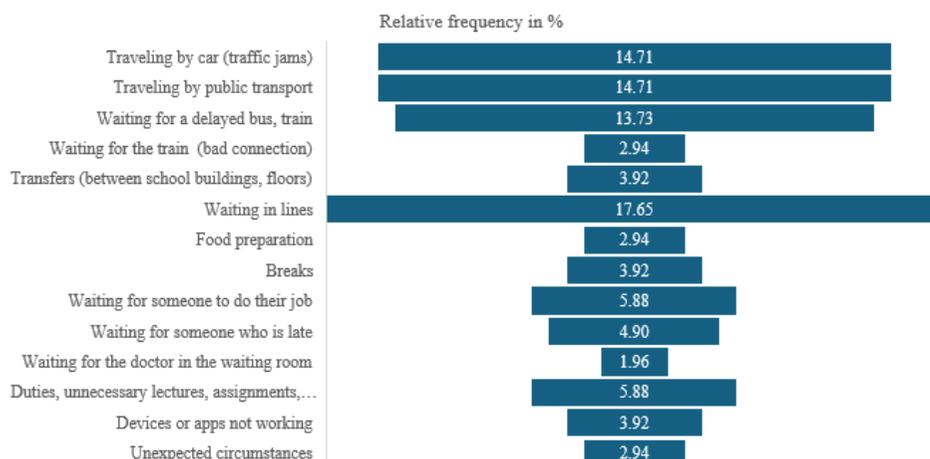
Source: (own elaboration, 2026)

The Table 1 presents the relationship between student characteristics and exam evaluation for a sample of 32 participants. Regarding gender, males represented the majority (56.25%), while females achieved a considerably higher proportion of grade A (37.5% compared to 21.88% for males), indicating better academic performance among female students in this sample. The largest group of students came from the study programme Applied informatics and automation in industry (31.25%), with top grades (A) distributed relatively evenly across different study programmes. Activity during seminars appeared to influence results, as only 15.63% of students were classified as active, whereas the majority of average and inactive students obtained lower grades. Similarly, lecture attendance showed an impact: 81.25% of students attended lectures more than half of the time, which correlates with a higher proportion of grades A and B. Points scored in the interim evaluation revealed that most students scored between 15 and 20 points (96.88%), with the highest scoring group (19–20

points) representing almost half of the sample, indicating a relatively homogeneous level of knowledge prior to the exam. Overall, the data suggest that gender, study programme, activity during seminars, and lecture attendance may serve as predictors of academic performance, with consistent participation and active engagement associated with better outcomes. The data presented in Table 1 so reflects the effort expended by students and overall study outcomes of students participating in the study.

The students who participated in the study were first asked to identify the causes of their inefficiency and most frequent time wasters, which they wrote down at the top of a piece of paper. The students then categorized the identified causes according to whether the source of these barriers was external factors or whether they were caused by themselves. Figure 1 shows the most frequently perceived external barriers to performance identified by the study participants.

**Figure 1: External barriers to performance**



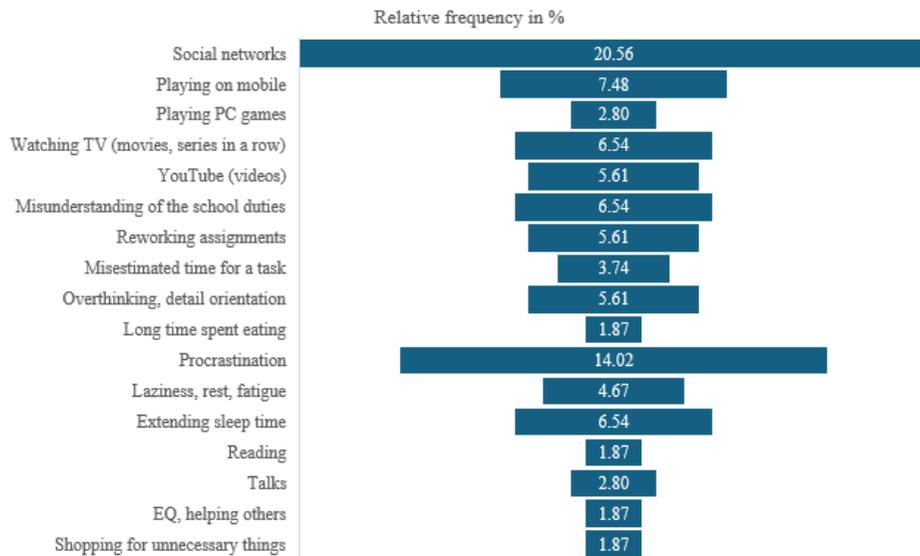
Source: (own elaboration, 2026)

As shown in Figure 1, the most common obstacle for students is travel, which they consider to be the biggest waste of time and transportation, these reasons were mentioned in 51 cases, (50.01% of the total number of responses). Another more frequently mentioned option was waiting in lines, whether in stores when shopping or in the school cafeteria, which was mentioned in 18 cases (17.65% of the responses). In 11 cases, representing 10.78% of the responses, they mentioned the people they must cooperate with as an obstacle, whether due to delays or delays in delivering materials for joint projects. In 6 cases, which makes up 5.88% of the responses, they mentioned duties in which they do not see any meaning and are not important to them. Members of Generation Z therefore negatively perceive activities that they perceive as unnecessary

and burdensome. This is consistent with the results of the study, which found that recognition, learning, values, and meaning are motivating for Generation Z (Araújo et al., 2025). From the participants' responses, members of Generation Z particularly negatively perceive the loss of time associated with moving or caused by waiting. Generation Z therefore prefers flexible schedules over fixed work or study schedules, which have been confirmed to have a positive impact on their initiative and voluntary activities and the scope of their obligations (Taibah and Ho, 2023). Flexible schedules also contribute to well-being in young people and are also linked to their health (Park and Lee, 2025).

Figure 2 shows the factors that participants identified as internal, which cause them to be inefficient and not use their time for what is useful for their performance.

**Figure 2: Internal barriers to performance**



Source: (own elaboration, 2026)

The data shown in Figure 2 shows that the most serious cause of inefficiency and time loss for Generation Z is social networks, which were indicated in 22 responses (20.56% of the total number of responses). The most frequently followed networks are Instagram, Facebook and Tik Tok. Social networks serve as primary interaction tools for Generation Z, who have a strong motivation to be present on these platforms, and not to use them exclusively for obtaining information (Gallego Gómez et al., 2024). Figure 2 also shows that the second most common option is procrastination, where students put off their tasks until the last minute, which they indicated 15 times (14.02% of the responses). It turns out that the absence of external regulation in the digital space often leads to

procrastination, even though the strong digital literacy of Generation Z creates optimal conditions for informal education. Even their positive attitude towards innovations is not a sufficient factor to eliminate the tendency to procrastinate (Lim and Lee, 2024). Integrating technology into education increases engagement, but also increases demands on self-regulation, which further complicates procrastination behaviour (Lyu and Park, 2024). Participants attribute further time loss to watching films, series and videos, with the main problem being that they watch many of them in a row. They mentioned this time loss 13 times in total (12.15% of the responses). The same number of responses concerned misunderstanding the curriculum at school along with reworking assignments. This indicates that students from Generation Z do not check with the teacher whether they understand the assignment correctly, nor do they ask for an explanation of the curriculum they do not understand. This causes them to have to spend a lot of time and effort preparing for exams and working on assignments at home, which can lead to a decrease in their motivation to study. The reason may be traditional teaching, which does not allow for discussion. Research confirms that Generation Z students show little interest in traditional teaching methods and prefer interactive and interesting approaches that stimulate their motivation to learn (Erişen and Bavlı, 2024; Zhou et al., 2024; Dodson and Thompson-Hairston, 2025). Traditional formal teaching without discussion that would allow for a deeper understanding of the content significantly affects the study of Generation Z, because it fails to effectively engage and motivate students. An interesting finding is that for students, as reported in 6 cases (5.61% of responses), overthinking and excessive analysis and dealing with details are obstacles to performance. A dangerous form of overthinking is especially rumination, when a person repeatedly and compulsively returns to negative thoughts, past mistakes or problems. It makes a person passive and prevents them from looking for solutions. An important role is played here by the so-called self-regulatory executive function of the mind, which affects whether an individual tries to solve problems or starts to think about them repeatedly and thus ruminate, which can lead to procrastination or depression (Kolubinski et al., 2017). The digital environment in particular requires a high level of self-regulation because it offers an infinite number of stimuli. If a student does not have a well-adjusted level of self-regulation, technology instead of education activates the fear of failure, leading to rumination about school. Consequently, instead of duties, they choose to escape to social networks as a strategy to cope with the fear of failure, which leads to procrastination (Saura et al., 2025). Subsequently, we focused on which tasks students most often procrastinate and what the reasons are for putting off these obligations, as shown in Table 2.

**Table 2: Most frequently postponed duty tasks**

	AF	RF [%]
School assignments	20	62.50
Exam preparation	3	9.38
Arranging documents and travel tickets	2	6.25
Shopping	2	6.25
Vehicle maintenance	2	6.25
Personal matters	3	9.38
Sum	32	100.00

Source: (own elaboration, 2026)

The data in Table 2 shows that the most frequently postponed tasks are clearly assignments from subjects that students are supposed to complete during the semester. In 6 cases (18.75%), the participants stated that these assignments are lengthy. In 5 cases (15.63%) the reason was that they did not want to do them or that they were too lazy to do them. Similarly, 4 times (12.50%) each, the reasons were that they had other obligations that were equally important and that the assignments had a later deadline, so they postponed them as long as possible. In the next part of the study, we focused on whether students themselves could identify ways in which they could eliminate some of the external or internal causes of inefficiency and improve their study performance. The results are contained in Table 3.

**Table 3: Identified improvement opportunities**

	AF	RF [%]
Restriction of mobile devices	9	18.37
Uninstalling a social network	3	6.12
Uninstalling games from phones	2	4.08
Make effective use of waiting time (the space between lectures)	4	8.16
Drive outside of peak hours, check the traffic situation	4	8.16
Limit time spent preparing food and eating	3	6.12
Keep your computer files organized and your notes organized	2	4.08
Limit travel	2	4.08
Limit yourself to 1 movie, series	5	10.20
Set goals, record tasks and make a schedule	6	12.24
Find a way to mentally regenerate yourself	2	4.08
Other	7	14.29
Sum	49	100.00

Source: (own elaboration, 2026)

As shown in Table 3, the most responses concerned the use of mobile phones, but the responses indicate that most students could limit the time spent in front of the mobile phone screen, which was seen by 9 participants (18.37% of the total responses). Only a smaller part of the students would be willing to uninstall mobile networks from their phones (3 responses, 6.12%) or games (2 responses, 4.08%). Interestingly, 6 participants (12.24%) are aware that it would help them to better set goals, mark tasks and plan their fulfilment in the form of a schedule. They should

try out the possibilities of using time management techniques in the subject focused on management skills that they have completed.

#### 4. CONCLUSION

The presented article was focused on identifying perceived barriers to Generation Z performance in the context of higher education and on the possibilities for its improvement. Through qualitative research, it was possible to gain a deeper understanding of the subjective experiences of students and the factors that influence their efficiency and tendency to procrastinate. The results of the qualitative study indicate that the performance of Generation Z is influenced by a combination of external and internal factors, the most significant of which are time losses associated with traveling and waiting, as well as internal barriers in the form of excessive use of social networks, procrastination and insufficient self-regulation. These findings indicate the high sensitivity of Generation Z to the digital environment, which can be both a source of efficiency and a significant barrier to performance.

A positive finding is that students can identify specific ways they could improve their performance, particularly through better planning, goal setting, and limiting digital distractions. The most frequently cited were limiting mobile device use, better task planning, goal setting, and more efficient use of time. This suggests that Generation Z has the potential to work on their own self-regulation, if they have the right tools, support, and an environment that enables these efforts.

The findings point to the need to rethink traditional approaches to the organization of higher education. The use of more flexible and interactive forms of higher education that support the autonomy, self-regulation and psychological well-being of Generation Z students can significantly contribute to increasing the performance of Generation Z.

Despite the beneficial findings, the study has certain limitations, especially in the form of the research sample size and the focus on students of a single subject. Despite these limits, the article provides valuable insights that can serve as a basis for the creation of more effective educational strategies reflecting the needs and expectations of Generation Z.

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## UNIVERSITY STUDENTS' ATTITUDES TOWARD INNOVATIVE, DIGITAL, AND NEW TEACHING METHODS IN HIGHER EDUCATION

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**Abstract:** *Universities are integral parts of, and often starting points for, innovation, technological advances, and development. Our research aims to explore how university students view the role of innovation, digitalization, and new teaching methods in their personal and professional development. The research was conducted in the fall of 2025 in the form of a quantitative questionnaire survey involving 498 Hungarian university students. The data was processed using SPSS software, applying simple and complex statistical methods. The results indicate that students' attitudes towards educational innovation and the impact of digital technology can be categorized into two distinct latent dimensions. As a result of the cluster analysis, three distinct student attitude segments can be identified. In terms of gender distribution, female respondents are more likely to be found in the pragmatic and innovation enthusiast clusters. In terms of cluster membership by field of study, there is a clear difference between students of economics and technical fields. In terms of university type, 24.8% of students at public universities are sceptics, compared to 17.0% at private universities. The innovation enthusiast profile is balanced across university types.*

**Keywords:** *Student Attitudes, Educational Innovation, Digital Teaching Methods, Technology Acceptance, Higher Education*

**JEL Classification:** *I23, I21, O33*

### 1. INTRODUCTION

The digitalization of higher education and the growing prevalence of educational innovation have significantly transformed teaching and

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learning processes over the past decade. Universities are increasingly being conceptualized as complex learning ecosystems in which digital technologies, pedagogical renewal, and institutional environments are closely intertwined (Fernandes et al., 2024; Guo et al., 2025; Ficzer, 2024). In this context, educational innovation entails not only introducing new tools but also transforming learning environments and teaching methods (Karimova, 2025). Students are not merely the target group of such innovations, but also active interpreters and participants in these changes. The acceptance of digital solutions largely depends on the extent to which students perceive them as useful, relevant, and supportive of their learning (Davis, 1989; Baki et al., 2018). As a result, student attitudes play a crucial role in the institutional embedding of educational innovations (Berényi & Deutsch, 2023; Halász & Kenesei, 2022). Previous research on technology acceptance has typically focused on individual factors or specific technological tools, with limited attention paid to the complex, multidimensional structure of student attitudes. Students are often treated as a homogeneous group, overlooking attitudinal differences and their embedding in institutional, educational, or demographic contexts (Kenesei, 2024; Shamsuddin et al., 2025; Mohd Talib et al., 2023).

To address this research gap, we formulated the following research questions:

**RQ1:** *What attitudinal dimensions characterize Hungarian university students' perceptions of educational innovation and the impact of digital technologies?*

**RQ2:** *Can distinct attitudinal segments be identified along the dimensions uncovered?*

**RQ3:** *How do these clusters differ, and which background variables show significant associations?*

The aim of this study is to address this gap by applying an attitude-based analytical approach. Specifically, our research seeks to explore how university students perceive the role of innovation, digitalization, and new teaching methods in their personal and professional development.

## **2. LITERATURE REVIEW**

### ***2.1 Theoretical and Conceptual Framework***

The integration of digital technologies into higher education has fundamentally transformed educational practices and the organization of learning in recent years, while also significantly influencing students' attitudes toward innovation, technology use, and their learning environments. The acceptance of educational innovations is not merely a technological issue; it is a complex, attitude- and experience-based process in which perceived usefulness, learning relevance, and institutional support all play crucial roles (Fernandes et al., 2024; Ficzer, 2024).

In this context, educational innovation refers to the integrated interpretation of pedagogical and technological advancements aimed at enhancing learning experiences and improving outcomes. The development of student attitudes is shaped by a combination of previous learning experiences, motivational patterns, and the perceived institutional environment (Ficzere, 2024). Therefore, the evaluation of innovations cannot be considered universal, as it is highly influenced by local educational and institutional conditions. Research on technology acceptance has a long-standing tradition, especially in higher education contexts. The Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT, UTAUT2) focus on key factors such as perceived usefulness, effort expectancy, social influence, and hedonic motivation (Venkatesh et al., 2012). While these models provide effective frameworks for explaining technology use, they are insufficient on their own to fully capture the multidimensional nature of students' experiences and attitudes. Empirical research conducted during the COVID-19 pandemic highlighted substantial variation in students' perceptions of digital learning environments, particularly in terms of learning experience quality, engagement, and self-regulation (Cranfield et al., 2021). These findings confirm that student attitudes are organized along multidimensional structures, which supports the need to extend classical technology acceptance models with institutional, experiential, and contextual considerations (Berényi & Deutsch, 2023; Halász & Kenesei, 2022).

## ***2.2 Educational Innovation and Institutional Support***

The effectiveness of educational innovation in higher education does not solely depend on the advancement of the technologies employed, but also on the extent to which institutions are able to create supportive learning environments. The successful embedding of educational innovations is influenced by instructors' methodological preparedness, the coordinated use of pedagogical and digital tools, and the quality of institutional communication (Fernandes et al., 2024; Schaap et al., 2025). Empirical studies consistently demonstrate that students' attitudes toward innovation are strongly linked to perceived institutional support. The quality of teacher–student communication, access to mentoring opportunities, and the provision of regular, constructive feedback all contribute to the acceptance of technological solutions and to students' engagement with learning (Berényi & Deutsch, 2023; Halász & Kenesei, 2022). Schaap et al. (2025) emphasize in their review that innovation is not merely a technological issue, but is rooted in organizational culture, leadership commitment, and structural resources. A supportive institutional environment enhances the acceptance of innovation, while its absence may hinder openness to technology and diminish the overall quality of the learning experience.

### ***2.3 Digital Technology and Perceived Learning Experience***

The spread of digital technologies enables more flexible forms of learning organization and more personalized learning experiences. However, the assessment of learning effectiveness cannot be reduced to mere technological functionality. The literature emphasizes the importance of students' subjective perceptions, particularly in the dimensions of perceived usefulness, enjoyment, and support (Baki et al., 2018; Tabassum et al., 2024). In the UTAUT2 model, hedonic motivation and performance expectancy play a central role in the acceptance of technology use, which is especially relevant in the context of higher education (Halász & Kenesei, 2022). Meta-analytic findings show that perceived usefulness and perceived enjoyment significantly influence students' learning intentions and engagement, particularly in blended learning environments (Baki et al., 2018). Tabassum et al. (2024) highlight that the quality of the digital learning experience is closely linked to the level of pedagogical support and accessibility. These findings support the view that the learning impact of digital technologies should be understood as a complex construct that captures technology acceptance and learning experience in an integrated manner.

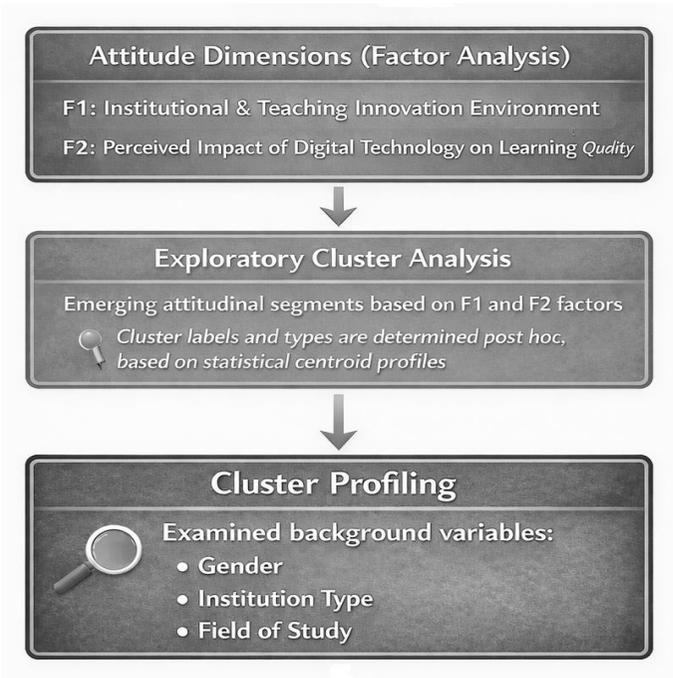
### ***2.4 Attitudinal Segmentation and Contextual Factors***

Understanding students' use of technology goes beyond examining individual intentions to adopt it. Attitudinal segmentation offers an opportunity to identify student groups differentiated by technological optimism, proficiency, vulnerability, and dependence (Parasuraman, 2000; Berényi & Deutsch, 2023). These attitudinal dimensions have a direct impact on learning behaviors and the acceptance of innovation. Both national and international studies confirm that clusters formed based on attitudes offer greater explanatory power than traditional demographic variables (Halász & Kenesei, 2022; Talib et al., 2023). At the same time, demographic and institutional background factors – such as gender, field of study, and type of institution – play an important contextual role in shaping student attitudes (Kenesei, 2024; Segura et al., 2024). According to the international literature, the joint analysis of student attitudes and background variables is both theoretically grounded and practically relevant, especially when it comes to the differentiated implementation of educational innovations (Wang et al., 2024; Shamsuddin et al., 2025).

### ***2.5 Conceptual Model***

Based on the theoretical and empirical literature, the present study is structured around a three-step analytical framework. As a first step, we use factor analysis to identify the underlying structure of students' attitudes toward educational innovation and digital technology. In the second phase,

we apply cluster analysis along the extracted attitudinal dimensions to identify distinct student attitude segments. Finally, in the third step, we examine cluster membership in relation to demographic and institutional background variables. Figure 1 summarizes the conceptual model of the research.



1. Figure 1: Research Model

Source: authors' own compilation

### 3. METHODOLOGY

The research was a quantitative, cross-sectional study that aimed to explore students' attitudes toward educational innovation and digital technologies in higher education. Data collection was conducted via an online questionnaire in the spring of 2025, with voluntary, anonymous participation. The study was conducted in accordance with internationally accepted research ethics standards and was approved in advance by the Research Ethics Committee of the University of Pannonia (KEB 28/2025(10.03)). The number of valid responses in Hungary was 498. Respondents came from various academic fields and types of institutions (public and private). The gender distribution of the sample was as follows: 60.8 percent female, 38.6 percent male, and 0.6 percent did not respond. The questionnaire statements were evaluated by students on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The first research question focused on the latent dimensions of students' attitudes toward educational innovation and the impact of digital technologies, while the second examined whether distinct student segments could be identified along the revealed attitudinal dimensions. The third research question

aimed to determine which background variables showed significant differences in relation to cluster membership. To analyze this, cross-tabulation and Pearson's chi-square test were applied. The purpose of the statistical tests was to explore the extent to which these variables contributed to the differentiation of cluster membership and whether specific clusters could be characterized by distinct social and institutional background profiles. Based on the literature and the conceptual framework, three empirically testable hypotheses were formulated. The first hypothesis (H1) assumes that students' attitudes toward educational innovation are structured into two clearly interpretable latent dimensions. This assumption is based on previous factor-analytical studies (e.g., Parasuraman, 2000; Berényi & Deutsch, 2023) and the construction logic of the present research.

**H1:** *Students' attitudes toward innovative education are structured into two latent dimensions.*

The second hypothesis (H2) assumes that student groups with different attitudinal patterns can be distinguished along the attitudinal dimensions (Wang et al., 2024).

**H2:** *Along the revealed dimensions, three stable and clearly distinguishable student attitude segments can be identified.*

The third hypothesis (H3) examines the relationship between cluster membership and background variables, with particular emphasis on the role of academic field. Based on previous research (Kenesei, 2024; Segura et al., 2024), it is assumed that attitudes toward technology differ significantly across fields such as humanities, economics, health sciences, and engineering.

**H3:** *Cluster membership differs significantly by field of study.*

The order of the hypotheses reflects the sequence of analysis. First, the latent dimensions underlying student attitudes were identified (H1), then student clusters were created based on these dimensions (H2), and finally, the relationship between cluster composition and background factors was examined (H3).

## 4. RESULTS

### 4.1 Identification of Student Attitudinal Dimensions

To map students' attitudes toward educational innovation and digital technologies, we conducted an exploratory factor analysis (EFA) using SPSS software. The analysis was based on 10 items, measured on a 5-point Likert scale, each assessing students' attitudes toward educational methods and technological innovations. The objective was to identify the latent dimensions that structure student perceptions. Prior to the analysis, we conducted an iterative item screening process to remove those items that did not clearly load on any factor, showed low communalities, or

resulted in problematic cross-loadings. This step aimed to enhance the interpretability and stability of the factor structure. The final model resulted in a two-factor solution, as the eigenvalue of the third factor did not exceed the threshold of 1.0 and thus did not contribute meaningfully to the explanatory structure. Initially, we also tested the applicability of the full 19-item scale; however, items related to well-being and overload did not reliably align with the identified attitudinal constructs and were therefore excluded from the model. The sample's suitability for factor analysis was confirmed by a Kaiser–Meyer–Olkin (KMO) measure of 0.872 and a statistically significant result on Bartlett’s test of sphericity ( $p < 0.001$ ). Most communality values exceeded the recommended threshold of 0.3, indicating a stable factor structure (see Table 1). For extraction, we used the Principal Axis Factoring (PAF) method, and for rotation, the Promax technique, as the factors were assumed to be correlated.

**Table 1: Factor Structure of Student Attitudes**

<b>Components</b>	<b>Factor 1: Innovation Environment</b>	<b>Factor 2: Impact of Digital Technology</b>
<b>My university supports innovation and new approaches in education.</b>	0.588	
<b>The administrative and academic structure of my university supports the implementation of innovative teaching methods.</b>	0.639	
<b>I have adequate access to digital learning resources that support lifelong learning.</b>	0.524	
<b>Instructors at my university apply innovative teaching methods.</b>	0.796	
<b>I feel encouraged to try new learning methods (e.g., self-directed learning, project-based learning).</b>	0.538	
<b>My university provides appropriate support for maintaining students’ mental health and well-being.</b>	0.548	
<b>The integration of modern technologies (e.g., digital tools, e-</b>		0.589

<b>learning) into education significantly improves the quality of my studies.</b>		
<b>Flexible educational systems, as opposed to traditional approaches, are key to preparing students for a dynamic labor market.</b>		0.398
<b>Innovative educational approaches support my critical thinking and personal development.</b>		0.591
<b>Modern teaching methods and technologies enable me to acquire the skills needed for my future career.</b>		0.688

Source: own compilation based on SPSS output

As a result of the factor analysis, two clearly interpretable attitudinal dimensions emerged. The first factor, labeled "Innovation Environment," reflects the extent to which students perceive openness and support for educational innovations, new methodological approaches, and the promotion of students' mental well-being within the institutional and instructional context. The second factor, "Impact of Digital Technology," captures the extent to which students perceive digital tools – such as e-learning platforms or applications of artificial intelligence – as supportive of their learning and as sources of career-relevant knowledge. A moderately strong positive correlation was found between the two factors ( $r = 0.602$ ), indicating that although they represent distinct dimensions, they also partially overlap in attitudes. *This two-dimensional attitudinal structure supports Hypothesis 1 (H1).*

#### **4.2 Identification of Student Attitude Segments**

Based on the two attitudinal dimensions identified through factor analysis, we conducted a cluster analysis to identify distinct student attitude profiles. The aim of the cluster analysis was to generate a segmentation pattern that would enable higher education institutions to develop more targeted development strategies and communication approaches. As a first step, standardized factor scores were calculated using the Z-score transformation. We then applied hierarchical clustering (Ward's method, squared Euclidean distance) and, based on the resulting dendrogram, selected a three-cluster solution, as this level showed a clearly interpretable and statistically justified breakpoint. The final cluster

structure (Table 2) was determined using a three-cluster K-means clustering procedure.

**Table 2: Cluster Structure of Student Attitude Segments**

	<b>Cluster1</b>	<b>Cluster2</b>	<b>Cluster3</b>
<b>Number of cases</b>	n <sub>1</sub> =242	n <sub>2</sub> =150	n <sub>3</sub> =106
<b>Z-score<sub>F1</sub></b>	-0.1225	1.0836	-1.2539
<b>Z-score<sub>F2</sub></b>	-0.0800	1.0413	-1.2908

Source: own compilation based on SPSS output

The first and largest cluster (n<sub>1</sub> = 242; 48.6%) was labeled “Pragmatists.” Members of this group demonstrated balanced, neutral attitudes regarding both institutional innovation and the impact of digital technology on learning. The second cluster (n<sub>2</sub> = 150; 30.1%) was labeled “Future-Oriented Innovation Enthusiasts.” Students in this segment showed distinctly positive attitudes on both dimensions: they perceived the educational environment as supportive and highly valued the role of digital technologies. The third and smallest cluster (n<sub>3</sub> = 106; 21.3%) consisted of students who expressed negative attitudes toward both the institutional and technological dimensions. This group, labeled “Innovation Skeptics,” reported low levels of support and was skeptical of the learning benefits of technological innovations. *The three clusters are clearly distinguishable, form a statistically stable structure, and thus support Hypothesis 2 (H2).*

#### ***4.3 Differences in Cluster Membership by Demographic and Institutional Background Variables***

Following the identification of attitude segments, we examined the relationship between cluster membership and students’ background variables. The aim of the analysis was to uncover social and institutional characteristics that may contribute to a deeper understanding of the attitudinal profiles. Gender-based distribution differences were not found to be statistically significant according to the chi-square test (p = 0.097), though meaningful differences in gender ratios across clusters were observed. In the Pragmatist group, 61.6% of respondents were female, while among Innovation Enthusiasts, this proportion was 66.7%. In contrast, the Skeptic cluster showed a balanced gender distribution. These findings suggest that female students are somewhat more likely to belong to the more positive attitude segments, although gender cannot be considered a defining variable for cluster formation. By contrast, the field of study showed a statistically significant relationship with cluster membership (p = 0.004; Cramer’s V = 0.139), indicating a moderate association. Half (50.7%) of the economics students were assigned to the Pragmatist group, while 29.9% were Innovation Enthusiasts and 19.4%

belonged to the Skeptic cluster. Among engineering students, skeptical attitudes dominated (34.6%), and only 21.2% fell into the innovation-positive group. Despite their smaller sample sizes, students from the humanities and health sciences were represented in higher proportions in the more open, innovation-receptive clusters. Differences by institution type (public vs. private university) were not statistically significant ( $p = 0.075$ ), though some trends were observed. While 24.8% of students at public universities belonged to the Skeptic group, this proportion was lower among private university students (17.0%). The proportion of Innovation Enthusiasts was equal across institution types (50–50%). Overall, cluster membership was found to differ significantly by academic field, while gender and institution type played more descriptive roles. These results support Hypothesis 3 (H3).

## **5. DISCUSSION**

The two main attitudinal factors identified in the study – openness to educational innovation and critical orientation toward digital technologies – clearly support the theoretical perspective that the learning environment cannot be understood solely through a technological lens. The results indicate that students' perceptions are equally shaped by psychosocial factors, institutional culture, and prior educational experiences, in line with findings from the international literature (OECD, 2025; Guo et al., 2025; Spante et al., 2018). The three attitudinal segments identified through cluster analysis – Innovation-Oriented, Pragmatic, and Skeptical students – demonstrate that the reception of educational innovations in higher education is far from uniform. This differentiation is consistent with the conclusions of Jayalaxmi (2016) and Karimova (2025), who emphasize that the effectiveness of educational innovation largely depends on the extent to which institutions are able to accommodate students' diverse attitudes and expectations. While Innovation-Oriented students tend to perceive digital solutions as opportunities and tools for development, members of the Skeptical cluster often associate the technological environment with uncertainty and anxiety. Our findings align with those of Ahsan et al. (2015) and Byers and Callahan (2024), who suggest that the dominance of digitalization may diminish the personal nature of education. For skeptical students, teacher presence, personalized feedback, and supportive relationships play an especially important role. For them, blended learning – an approach that combines traditional and digital elements – can provide an effective framework for building technological confidence and reducing anxiety (Suleimanova, 2020; Sidiqova, 2025). In contrast, the Pragmatic cluster indicates that students primarily evaluate innovations based on their practical utility and immediate applicability. This finding is consistent with the results of Shet (2024) and Alessa and Hussein (2023), who argue that perceived

usefulness is a key determinant of technology acceptance. In this group, educational design is most effective when the practical benefits of innovation – particularly for learning and employability – are clearly communicated. The practical relevance of attitudinal segmentation lies in its potential to inform the targeted design of development and educational policy interventions. Actively involving Innovation-Oriented students in shaping the learning environment may strengthen engagement and institutional affiliation. For Skeptical students, stable and predictable hybrid learning formats, increased teacher presence, and supportive feedback systems may be essential. For the Pragmatic group, learning paths that focus on results and immediately applicable knowledge are likely to be most effective. Based on these results, it is recommended that institutions regularly assess student attitudes using reliable and validated measurement tools. In addition, teacher training should be expanded to include competencies for attitude-based differentiation, with particular attention to recognizing technological anxiety and learning motivation. It is also important to create flexible learning environments that are deliberately adapted to the characteristics of different attitudinal types. This study contributes to a more nuanced implementation of educational innovation in higher education – one that moves away from a uniform, one-size-fits-all approach and instead takes student attitudes into account, thereby enhancing both learning effectiveness and long-term sustainability.

## **6. CONCLUSION**

The findings of the study clearly indicate that students' attitudes toward educational innovation do not form a homogeneous whole. Based on factor analysis, two key attitudinal dimensions – perceived institutional support and the perceived learning-supporting potential of digital technologies – served as the basis for identifying three distinctly different student groups. The practical relevance of the research lies in its demonstration that the success of educational innovations largely depends on taking into account the diversity of student attitudes. Consequently, the planning and implementation of educational development efforts require a differentiated approach. Attitude-based segmentation enables institutions to develop more targeted development strategies and educational policy interventions tailored to the expectations and needs of different student groups. Among the limitations of the study is its reliance on cross-sectional, quantitative data collection, which does not allow for the exploration of causal relationships or the tracking of attitudinal changes over time. Furthermore, the sample is limited to students in Hungary, which restricts the generalizability of the results. To explore deeper experiential and motivational factors, the use of qualitative methods would also be warranted. Future research should consider conducting longitudinal studies to track the evolution of student attitudes, as well as

international comparative analyses to explore cultural and institutional differences. Interview-based or focus-group approaches could further enrich understanding of the underlying content and meaning of the identified attitudinal patterns. Overall, the findings reinforce the view that educational innovation is not merely a technological issue but a complex process encompassing student attitudes, learning culture, and the institutional environment. A conscious consideration of students' perspectives is therefore essential for higher education to effectively respond to the diverse learning needs of the 21st century.

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## CONSUMER BEHAVIOUR OF GENERATION Z UNIVERSITY STUDENTS

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**Abstract:** *The paper examines the consumer behaviour of Generation Z university students as a distinct group shaped by the higher education environment and increasing economic independence. The study aims to synthesise key determinants influencing their consumption behaviour, with a particular focus on digital marketing, influencer credibility, branding, price sensitivity, and sustainability. Based on a review of recent academic literature and secondary data sources, the article highlights that Generation Z students are informed and pragmatic consumers who rely strongly on online information, peer recommendations, and social media content. While price remains a central factor due to financial constraints, brand trust, authenticity, and personalised digital experiences also play an important role in shaping purchasing decisions. The literature indicates an ambivalent relationship with sustainability: although environmental and social responsibility are generally perceived positively, they only partly translate into a willingness to pay a price premium. Overall, the article contributes to a clearer understanding of Generation Z consumer behaviour in the higher education context and provides insights relevant for marketing strategies targeting young consumers in increasingly digitalised and value-oriented markets.*

**Key words:** *brand trust, consumer behaviour, digital environment, generation z university students, price sensitivity*

**JEL Classification:** *D12, M31, O33*

### 1. INTRODUCTION

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Generation Z has become one of the most significant consumer groups in recent years, not only in terms of demographic development but also with regard to its growing economic importance. This generation, commonly defined as the cohort born approximately between 1995 and 2012, is currently studying at universities or gradually entering the labour market, gaining economic independence and beginning to exert a substantial influence on consumer trends. Its specific characteristics—most notably a strong attachment to digital technologies, a high level of information awareness, and an emphasis on values such as authenticity, transparency, and sustainability—are fundamentally reshaping traditional conceptions of consumer behaviour.

Particular attention should be paid to university students belonging to Generation Z, who represent a distinct and non-negligible subgroup of this generation. According to data from the Czech Statistical Office, as of the end of 2024 there were 314,850 university students in the Czech Republic (representing 2.9% of the total population), of whom 55,996 were international students; in the same year, 66,379 individuals successfully completed their university studies. These individuals are situated in a transitional phase between economic dependence and independence: they typically operate under constrained financial resources while simultaneously exhibiting a high degree of decision-making autonomy. Although they constitute a relatively small proportion of the population in quantitative terms, their importance should not be assessed solely on this basis, but rather in light of their economic, social, and cultural potential. Their consumer behaviour is shaped not only by price sensitivity but also by the intensive influence of digital marketing, social media, online reviews, and influencers. Examining the behaviour of this group therefore provides valuable insights into future consumer trends as well as into the persistent gap between declared values and actual purchasing behaviour.

Although young consumers often declare a high level of environmental and social awareness, these attitudes do not always translate into actual purchasing decisions. Among university students, this discrepancy is further reinforced by economic constraints, which may reduce their willingness to pay a price premium for sustainable products. Understanding the consumer behaviour of this group is therefore essential not only for academic research but also for the development of effective marketing strategies and responsible business practices.

The aim of this article is to contribute to a deeper understanding of the consumer behaviour of Generation Z university students through a systematic synthesis of existing academic literature, with a particular focus on the digital environment, brand perception, trust, price sensitivity, and sustainability.

## 2. THEORETICAL FRAMEWORK

Consumer behaviour has long been understood in economic and marketing literature as a multidimensional process arising from the interaction of economic, psychological, social, and cultural factors (Androniceanu et al., 2020; Park et al., 2022). This perspective emphasises that consumer decisions cannot be reduced to isolated price calculations but should instead be viewed as the outcome of a complex decision-making process in which individual preferences, social norms, available information, and institutional market conditions are intertwined.

In the case of Generation Z, this traditional understanding is further expanded by a technological and digital dimension. A growing body of literature agrees that the digital environment represents a key context for the consumer behaviour of this generation, which has grown up surrounded by digital technologies, online platforms, and social media (Matušić et al., 2024; Theocharis & Tsekouropoulos, 2025). In this regard, the digital environment does not function merely as an auxiliary communication channel but rather as a structural framework within which most consumer interactions of Generation Z take place.

### *2.1 Digital environment and consumer behaviour of Generation Z*

The literature consistently indicates that Generation Z is characterised by a high level of digital literacy and an intensive use of online information sources in the purchasing decision-making process. Online platforms, social media, and mobile applications significantly influence how information is searched for, how alternatives are evaluated, and how purchasing decisions are ultimately executed (Chang, 2023; Theocharis & Tsekouropoulos, 2025).

Online reviews, peer recommendations, and user-generated content play a particularly important role in the digital decision-making environment, as they are often perceived by Generation Z consumers as more trustworthy than traditional advertising messages (Ridwan et al., 2025). The digital environment thus creates a context in which informational, social, and technological aspects of consumer behaviour are closely intertwined.

### *2.2 Brand, trust, and value orientation*

In the digital environment, the role of the brand in the decision-making of Generation Z consumers has also evolved. Brands are no longer perceived solely as indicators of product quality or prestige, but increasingly as carriers of meanings, values, and social responsibility with which young consumers can identify (Theocharis & Tsekouropoulos, 2025).

Brand trust represents a key element of consumer decision-making, particularly in environments characterised by high levels of information saturation and asymmetry. The literature indicates that perceived brand authenticity, consistency of communication, and transparency are among the fundamental factors contributing to trust-building among Generation Z consumers (Flores et al., 2024). Trust is often conceptualised as a mediating factor influencing the relationship between brand characteristics and purchase intention.

A specific concept in this context is brand affinity. McKeever et al. (2021) emphasise that Generation Z's relationship with brands is shaped primarily by value compatibility, identity, and attitudinal alignment rather than solely by functional product attributes. Brand affinity is understood as an affective bond that may, but does not necessarily, translate into actual purchasing behaviour.

### *2.3 Social influence and influencer marketing*

Social influence constitutes another important determinant of Generation Z's consumer behaviour, particularly within digital environments. The literature highlights the role of peers, online communities, and social media platforms in shaping consumer attitudes and preferences (Ridwan et al., 2025).

A specific manifestation of social influence is influencer marketing, which is grounded in parasocial relationships between influencers and their audiences. Empirical studies confirm that influencers' authenticity, perceived closeness, and credibility significantly affect Generation Z consumers' attitudes and purchase intentions (Rao & Raghuvanshi, 2024).

Recent studies have begun to examine newer forms of influencer marketing, including virtual influencers. This stream of research draws attention to the importance of consumers' psychological characteristics and the perceived credibility of digital actors when assessing their influence on consumer behaviour (Angmo & Mahajan, 2024).

At the same time, the importance of technology-mediated interactions with brands is increasing, including personalised recommendations and tools based on artificial intelligence. Empirical studies confirm that digital experience, perceived usefulness of technologies, and the quality of brand interaction in online environments are among the key determinants of purchase intention among Generation Z consumers (Flores et al., 2024; Guerra-Tamez et al., 2024).

## *2.4 Price sensitivity and economic constraints of university students*

Despite the growing emphasis placed by Generation Z on values, authenticity, and sustainability, price remains one of the most significant determinants of consumer behaviour among university students. This group is typically situated in a phase characterised by limited financial resources and heightened economic uncertainty, which translates into greater price sensitivity and a more pragmatic approach to purchasing decisions (Potluri et al., 2024; McKinsey & Company, 2023).

The literature indicates that university students' willingness to prefer products with higher added value—such as sustainable or ethically produced goods—is strongly conditioned by the relationship between price and perceived product value (Lopes et al., 2024; Kumar et al., 2023). Economic constraints thus represent an important contextual factor shaping the extent to which value-based preferences and positive brand perceptions are translated into actual consumer behaviour.

Despite the growing number of empirical studies focusing on Generation Z's consumer behaviour, the existing literature remains fragmented and, in several respects, inconclusive. While some streams of research emphasise the central role of brand trust and value congruence in digital environments, other studies highlight the dominant importance of price and pragmatic decision-making, particularly among university students with limited financial resources. These divergent findings are often presented in isolation, with limited effort to integrate them or to explain the conditional relationships between individual determinants.

At the same time, there is a lack of integrative and synthetic studies that would consolidate findings from empirical research conducted across different contexts, methodological approaches, and product categories, and that would systematically explain why existing studies arrive at divergent conclusions regarding the relative importance of brand-related factors and price. This gap limits the ability to formulate more generalisable conclusions about Generation Z's consumer behaviour and to identify stable patterns in their decision-making processes.

### **3. RESEARCH OBJECTIVE**

The aim of the article is to systematically analyse and synthesise existing empirical evidence on the consumer behaviour of Generation Z university students, with a particular focus on the role of the digital environment, brand perception, price sensitivity, and sustainability, and, based on this synthesis, to identify key patterns, inconsistencies, and conditional relationships among the individual determinants.

### 3. RESEARCH QUESTIONS AND RESEARCH DESIGN

This article is conceived as a secondary research study combining bibliographic analysis, thematic analysis of abstracts, and conceptual synthesis of existing knowledge. The objective is not merely to summarise the existing literature, but to systematically map the structure of the research field on the consumer behaviour of Generation Z university students, identify dominant thematic streams, and explain differences in the conclusions of prior studies. In line with this research objective, the following research questions are formulated:

**RQ1:** *What is the thematic and structural configuration of current research on the consumer behaviour of Generation Z university students, as measured by the number of publications, dominant thematic areas, and their interrelationships?*

This question aims to map the research field through bibliographic analysis and keyword analysis, focusing on the identification of major research areas, their relative prominence (number of studies), and the structural organisation of the literature.

**RQ2:** *What major research streams can be identified in the literature, and how are these streams interconnected based on thematic analysis of abstracts and keyword clusters?*

This question integrates quantitative bibliographic mapping with qualitative thematic synthesis. Its aim is to reveal how themes related to the digital environment, brand and trust, sustainability, price sensitivity, and social influence intersect within the literature, and whether these topics are examined in an integrated manner or rather in isolation.

**RQ3:** *How can the apparent discrepancy between studies emphasising the importance of brand, trust, and values and those highlighting price sensitivity in the decision-making of Generation Z university students be explained based on the thematic structure of the literature?*

This interpretative question responds to the identified research gap and seeks to explain the inconsistencies observed in the conclusions of existing studies. Rather than interpreting these differences as contradictory findings, they are understood as the result of divergent thematic and methodological orientations across individual research streams.

#### 4.1 Literature search strategy

Relevant academic sources were identified through the **Web of Science** database, which covers key peer-reviewed high quality journals in the fields of marketing, consumer behaviour, and the digital economy. The search was complemented by a selective review of highly cited studies and systematic reviews that are thematically related to the research problem.

The search terms used included combinations of keywords such as *Generation Z, university students, consumer behaviour, digital marketing, brand trust, price sensitivity, sustainability, influencer marketing, and artificial intelligence*. The search was limited to studies published between 2020 and 2025 in order to capture up-to-date insights reflecting the dynamic development of the digital environment.

#### 4.2 Study selection criteria

The analysis included studies that met the following criteria:

- empirical or systematic review studies focusing on Generation Z,
- research examining consumer behaviour in digital environments,
- studies analysing at least one of the following key determinants: digital communication, brand and trust, price sensitivity, sustainability, or social influence,
- studies published in peer-reviewed academic journals or as research reports issued by reputable institutions.

Excluded were purely descriptive studies lacking analytical depth, studies focusing exclusively on other generational cohorts, and works without a clearly defined methodological framework.

#### 4.3 Analytical procedure

The selected studies were analysed using thematic content analysis, which made it possible to identify the main thematic areas and relationships among individual determinants of consumer behaviour. The analysis was conducted in three stages:

1. Coding of key concepts, such as the digital environment, brand trust, price sensitivity, value preferences, and sustainability.
2. Grouping of studies according to their dominant analytical focus (e.g. digital experience, brand-related factors, price, influencer marketing).

3. Synthesis of findings with the aim of identifying conditional relationships and explaining divergent conclusions in the existing research.

## 5. DISCUSSION

The aim of this article was to explain the consumer behaviour of Generation Z university students as a conditional process in which the digital environment, brand and trust, social influence, economic constraints, and sustainability interact, based on secondary research and a synthesis of the academic literature.

With regard to the scope and structure of the existing literature indexed in the Web of Science database, as of 9 January 2026 the Web of Science Core Collection recorded more than 11,000 publications thematically focused on Generation Z, of which 799 addressed consumer behaviour. After combining these streams and subsequently narrowing the focus to university students, the number of relevant records decreased substantially to 96 studies, indicating a relatively narrow yet thematically differentiated research field. The findings of this study are based not only on a qualitative synthesis of key publications but also on bibliographic and thematic analyses of a comprehensive dataset derived from the Web of Science database. The majority of the sources consist of journal articles (739; 92.5%), while a smaller proportion comprises conference papers (60; 7.5%).

The pronounced disparity between the breadth of general research on Generation Z and the limited number of studies specifically focused on university students supports the appropriateness of the chosen secondary research approach based on bibliometric analysis and thematic synthesis. The following section therefore focuses on the interpretation of the results of bibliometric mapping using the VOSviewer tool and on the discussion of the identified thematic clusters, their interrelationships, and their implications for future research on the consumer behaviour of Generation Z.

### 5.1 Structure of the literature and dominant research streams

The bibliographic profile of the dataset indicates that current research on the consumer behaviour of Generation Z is strongly anchored in behavioural constructs and models of purchase intention. This is particularly evident in the **Keywords Plus**, where terms such as *behaviour* (184), *consumption* (121), *attitudes* (86), *model* (83), *intention* (82), and *planned behaviour* (78) dominate. At the same time, trust (*trust* (44)) and the digital context (*social media* (46)) are prominently represented. With regard to **Author Keywords**, the core of the research is concentrated around themes related to Generation Z and consumer behaviour—*generation z* (318), *consumer behaviour* (74), *consumer behaviour* (45), *gen z* (71)—as well as key determinants such as *sustainability* (58),

*purchase intention* (46), *social media* (39), and *theory of planned behaviour* (33). This profile confirms that the literature is simultaneously intention-driven, digitally oriented, and value-framed, with sustainability repeatedly emerging as one of the most prominent thematic streams.

This structure is clearly visualised by the keyword co-occurrence map generated using VOSviewer (Figure1, Table 1) which reveals five relatively autonomous clusters. The red cluster (C1) comprises generational and comparative studies and concepts such as *generational cohort*, focusing on comparisons of consumer behaviour across generations (e.g. Baby Boomers, Generation X). The green cluster (C2) represents the core of behaviourally oriented research centred on purchase intention, trust, and models of planned behaviour (*purchase intention*, *trust*, *planned behaviour*, *norms*). The blue cluster (C3) reflects research on technological adoption and the digital environment, including concepts such as the Technology Acceptance Model (TAM), *perceived usefulness*, *adoption*, and *perceived risk*. The yellow cluster (C4) is primarily associated with research populations and methodological approaches, particularly the use of university students as respondents and the dominance of questionnaire-based and online surveys. Finally, the purple cluster (C5) focuses on sustainability and corporate social responsibility (CSR) and represents a distinct but relatively weakly integrated thematic stream. Overall, the resulting map confirms that the literature on Generation Z's consumer behaviour is thematically rich yet segmented into research streams that only partially overlap.

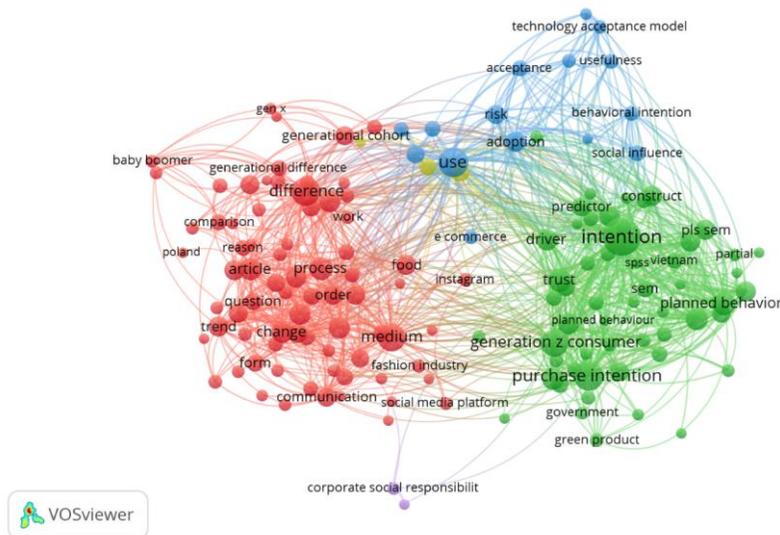


Figure1: Thematic clusters identified using VOSviewer

Cluster	Dominant keywords (examples)	Main research focus	Interpretation
C1: Generational and contextual approaches	generation, difference, process, change, trend, habit	Generational differences and long-term changes in consumer behaviour	Macro-level and comparative studies, often descriptive
C2: Purchase intention and behavioural models	intention, purchase intention, TPB, trust, subjective norm, SEM	Intention-based models and psychological determinants	Analytical core of the field with strong methodological consistency
C3: Digital environment and technology	digital, online, technology, use, experience, social influence	Digital context of consumption and technology-mediated behaviour	Digital environment as a key decision-making framework
C4: Students and methodology	university student, questionnaire, online survey	Research populations and methodological approaches	Dominance of student samples and quantitative surveys
C5: Sustainability and CSR	sustainability, green product, CSR	Sustainable and ethical consumption	Important but weakly integrated thematic stream

Table1: Description of Thematic Clusters (source. Own processing based on VOSviewer)

### 5.2 Thematic analysis of abstracts and implications for interpreting the “brand versus price” debate

The thematic analysis of abstracts revealed five stable thematic domains that correspond both to the dominant clusters identified in the VOSviewer map and to the frequency of keywords within the dataset. The most prominent streams focus on (1) digital marketing, social media, and online decision-making (approximately 28% of abstracts), (2) sustainable consumption in a broader sense (around 32%), followed by (3) green purchase intention (approximately 10%), (4) sustainable fashion consumption (approximately 10%), and (5) technology adoption (approximately 20%). A common denominator across these streams is the dominance of the purchase intention construct, relationship modelling approaches (SEM/PLS-SEM), and the search for determinants leading from *intention* to *behaviour*.

This structuring of the literature helps to explain the apparent discrepancy identified in the theoretical framework between the importance of brand and trust on the one hand and price pragmatism on the other. The dataset clearly shows that the main stream of research focuses on explaining purchase intentions, typically within digitally mediated and value-laden contexts (sustainability, trust, social media). By contrast, economic variables such as price sensitivity are not centrally articulated in keyword structures and may therefore appear as weaker determinants in the literature—not necessarily because they are less important in practice, but because they are often treated implicitly or methodologically marginalised in many studies. In other words, part of the literature logically arrives at conclusions emphasising the strength of brand, trust, and values because it analyses intentions and psychological constructs, whereas other studies, more strongly oriented towards pragmatic choices and barriers, highlight price as a key constraint.

The synthesis of these two lines of research supports an interpretative framework in which the consumer behaviour of Generation Z university students is conditional in nature: trust, brand, digital experience, and value-based attitudes shape preferences and purchase intentions, while the realisation of these intentions is constrained by economic affordability and the price sensitivity typical of the student population. This conclusion is particularly relevant in the context of sustainability, which is strongly represented in the dataset (*sustainability* ranks among the most frequent Author Keywords) and is frequently associated with the well-documented gap between declared values and actual behaviour.

### *5.3 Sustainability, digitalisation, and social validation: why values do not always translate into purchases*

The thematic distribution of abstracts suggests that sustainability appears in the literature in two distinct forms. The first relates to “green” purchase intentions, often directly linked to the Theory of Planned Behaviour and intention-based models. The second concerns a broader framework of sustainable behaviour (consumption, waste, circular economy), in which practical barriers and institutional contexts emerge alongside intentions. For Generation Z university students, a critical issue is that although the digital environment increases exposure to sustainability-related themes and value-oriented brand communication, the economic realities of the student life stage may hinder the translation of attitudes into actual behaviour. As a result, sustainability often functions as a secondary decision criterion, gaining importance primarily when combined with brand credibility, authentic communication, and affordable pricing.

The dataset also confirms that the digital environment functions not merely as a communication channel but as a mechanism of social validation. The prominence of *social media* among keywords and the presence of a distinct thematic stream focused on digital marketing and online decision-making indicate that Generation Z's purchasing behaviour is strongly shaped by social proof, recommendations, and digitally mediated trust. This further underscores the role of brand and trust as key filtering mechanisms in online environments characterised by information overload.

#### *5.4 Linking the findings to the research gap and the contribution of the article*

The results of the bibliographic analysis, the thematic analysis of abstracts, and the visualisation of the literature structure using **VOSviewer** collectively indicate that existing research on the consumer behaviour of Generation Z university students is characterised by thematic specialisation and limited integration across research perspectives. Individual research streams tend to focus either on generational and contextual differences, technological aspects of the digital environment, or behavioural models of purchase intention, while systematic integration of these approaches remains largely implicit rather than explicit.

This fragmentation of the literature helps to explain the identified research gap, which lies in the divergent and seemingly inconsistent conclusions of previous studies regarding the relative importance of brand, trust, and price sensitivity in the decision-making of Generation Z university students. Rather than interpreting these differences as contradictory findings, the thematic structure of the literature suggests that individual studies examine different stages of the decision-making process and operate at different analytical levels—ranging from the formation of purchase intentions to their realisation under conditions of economic constraint.

The contribution of this article lies in proposing, on the basis of a systematic synthesis of the literature, an integrative interpretative framework in which the consumer behaviour of Generation Z university students is conceptualised as a conditional process. Within this framework, the digital environment, brand, trust, and value-based preferences emerge as key factors shaping purchase intention, whereas price affordability and the economic circumstances of the student population play a decisive role in the realisation of that intention. This framework enables the integration of previously fragmented research streams and provides an explanation for why some studies emphasise

psychological and value-based determinants while others highlight economic pragmatism.

At the same time, this approach contributes to a more precise delineation of the role of sustainability in Generation Z's decision-making. Rather than being treated as a universal determinant, the synthesis indicates that, in the case of university students, sustainability exerts its influence primarily in combination with brand credibility, authentic communication, and an acceptable price level.

## **6. CONCLUSION**

Through bibliographic analysis and thematic synthesis of the literature, this paper demonstrates that research on the consumer behaviour of Generation Z university students is thematically rich yet fragmented into relatively autonomous research streams focusing on generational differences, technological adoption, behavioural models of purchase intention, the methodology of student-based research, and sustainability. The analysis of clusters and abstracts further indicates that differing conclusions in existing studies regarding the importance of brand and price are not contradictory, but rather stem from distinct thematic and methodological orientations across individual research streams.

The main conclusion of the study is that the consumer behaviour of Generation Z university students should not be understood as a trade-off between values and price, but rather as a conditional process in which brand, trust, and the digital environment shape purchase intention, while economic affordability determines its realisation. This interpretative framework helps to explain the persistent gap between declared values—particularly in the area of sustainability—and actual purchasing behaviour.

From a practical perspective, the findings suggest that strategies targeting Generation Z should not position sustainability and value-based communication in opposition to price, but instead seek their integration. Building a trustworthy brand and delivering a high-quality digital experience are essential for the formation of purchase intention; however, the translation of intention into actual behaviour requires affordable solutions and clearly communicated value for consumers. In this context, the digital environment functions not merely as a communication channel, but as a mechanism of social validation that fundamentally shapes the decision-making processes of young consumers.

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## WHO FEELS THE CAPACITY CRISIS? STUDENT PROFILES OF PERCEIVED CONSTRAINTS IN HIGHER EDUCATION

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**Abstract:** *The aim of this study is to provide a deeper understanding of capacity-related challenges in higher education by exploring examining students' perceptions in the context of innovative teaching approaches and the changing evolving expectations of Generation Z. To achieve this, the study analyzes investigates students' perceptions of capacity constraints and identifies the underlying dimensions and student profiles shaping that shapes these perceptions. A quantitative questionnaire survey was conducted in Hungary at the end of 2025 among involving 498 higher education students. The dData were analyzed using R, applying employing exploratory factor analysis as well as and hierarchical and K-means cluster analyses. The results reveal three interrelated dimensions: structural and teaching capacity shortages, lack of student support and personal attention, and mobility- and cooperation-based solutions. Based on these dimensions, three distinct student clusters (Crisis Voicers on the Move, Mentor-Hunters and Survivors) are identified, with institutional type playing a meaningful role, while gender and field of study show limited relevance.*

**Key words:** *cluster analysis, exploratory factor analysis, higher education capacity crisis, student perceptions*

**JEL Classification:** *I21, I23, I24, M00*

### 1. INTRODUCTION

Over recent decades, higher education systems have faced growing capacity constraints due to massification, rising student numbers, and

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increasing academic workloads (Tight, 2019; Hrubos, 2021). While these pressures are well documented at both system and institutional levels, much less is known about how they are experienced and interpreted by students in their everyday academic lives. Previous research suggests that students' evaluations of higher education are strongly shaped by learning environments, staff availability, and institutional support rather than by abstract structural indicators (Weerasinghe & Fernando, 2017; Martin & Bolliger, 2022; Cant et al., 2023). However, capacity-related challenges are rarely examined explicitly as a capacity crisis from the student perspective and are typically embedded within broader concepts such as educational quality or student experience (Oldfield & Baron, 2000; Matus et al., 2021). Against this background, the present study examines students' perceptions of the higher education capacity crisis as a distinct construct. Its aim is to identify the latent dimensions underlying these perceptions and to explore whether meaningful student profiles can be derived from them, thereby complementing dominant system-level approaches. The paper first reviews the literature, then presents the methodology and empirical results, and finally discusses the findings and their implications.

### ***1.1. Literature review***

Research consistently indicates that higher education systems operate under persistent and structurally embedded capacity constraints related to limited academic and human resources, infrastructural shortages, and enduring financial and governance limitations, particularly under sustained enrolment growth, including pandemic-related capacity pressures (Nardi & Gyurko, 2013; Frehywot et al., 2013; Bvumbwe & Mtshali, 2018; Connolly & Abdalla, 2022; Bacsa-Bán, 2022). In many systems, rising student numbers have not been matched by proportional increases in staffing or infrastructure, resulting in overcrowded learning environments and overstretched teaching capacities, often described as "massification without capacity" (Bvumbwe & Mtshali, 2018). Although digitalisation and online education are frequently framed as capacity-enhancing solutions, empirical evidence suggests that they may intensify organisational and human resource demands reflecting distance education capacity limits (Karadağ et al., 2021), when institutional support is insufficient (Frehywot et al., 2013; O'Doherty et al., 2018; Regmi & Jones, 2020).

From the student perspective, capacity-related challenges are typically examined through broader frameworks of educational quality, satisfaction, or student experience rather than being conceptualised explicitly as manifestations of a capacity crisis (Weerasinghe & Fernando, 2017; Matus et al., 2021; Napitupulu, 2025). Empirical studies show that overcrowding, staff overload, and limited accessibility negatively shape students' evaluations of educational quality and personal support reflecting

relational embeddedness deficits and faculty–student relationship quality (Gyóri & Pusztai, 2022; Martin & Bolliger, 2022; Cant et al., 2023; Delnoij et al., 2020; Gehreke et al., 2024; Opoku-Danso et al., 2025).

Finally, mobility and inter-institutional cooperation are increasingly framed as responses to capacity constraints through mechanisms of capacity sharing and extension, although access remains uneven and may reproduce institutional inequalities (Giesenbauer & Müller-Christ, 2020; Gunter & Raghuram, 2018; Csaszar et al., 2023). Methodologically, studies applying factor- or cluster-based approaches to student data have predominantly focused on service quality or learning experience, leaving the latent structure of perceived capacity constraints largely unexplored (Oldfield & Baron, 2000; Upadhayaya et al., 2021).

## **2. PROBLEM FORMULATION AND METHODOLOGY**

The present analysis examines how students perceive the higher education capacity crisis, whether these perceptions can be described by latent dimensions, and whether distinct student groups can be identified based on their perception patterns. Accordingly, three research questions are addressed: (RQ1) How is students' perception of the capacity crisis structured? (RQ2) Can distinct student groups be identified based on these perceptions? and (RQ3) Do these groups differ by selected background variables?

The empirical analysis is based on a questionnaire survey conducted among Hungarian students (N = 498). Data were collected using an anonymous, self-administered online questionnaire, where the participation was voluntary, and informed consent was obtained from all respondents prior to participation. The study was conducted in accordance with established ethical standards and received prior approval from the Research Ethics Committee of the University of Pannonia (KEB 28/2025(10.03.)). A subset of 19 Likert-type items capturing different aspects of perceived capacity-related challenges was used in the analysis. All items were recoded so that higher values indicate stronger perceived capacity problems, and data quality and inter-item correlations were assessed prior to analysis.

A two-step analytical strategy was applied. First, exploratory factor analysis (EFA) was used to identify latent perception dimensions. Second, cluster analysis based on factor scores was conducted to identify homogeneous student groups. Finally, clusters were profiled using background variables (gender, field of study, and type of institution). All analyses were performed using R Studio.

## **3. PROBLEM SOLUTION / RESULTS**

### ***3.1 Latent structure of students' perceptions (RQ1)***

Exploratory factor analysis was conducted, sampling adequacy was confirmed (KMO = 0.85; item-level MSA = 0.77–0.92), and Bartlett’s test of sphericity was significant ( $\chi^2(171) = 2842, p < 0.001$ ), indicating the data’s suitability for factor analysis. Factor retention was based on scree plot inspection and parallel analysis, both supporting a three-factor solution. Factors were extracted using Principal Axis Factoring with Promax rotation, allowing for correlated latent dimensions. The resulting structure was well defined, with no substantial cross-loadings at the applied threshold.

**Table 1. Factor loadings of the three-factor solution (PAF, Promax rotation)**

Item	Factor 1: Structural capacity shortage	Factor 2: Lack of student support	Factor 3: Mobility and solutions
B1	0,736		
B2	0,499		
B10	0,823		
B11	0,701		
B12	0,602		
B13	0,679		
B14	0,524		
B18	0,411		
B4		0,413	
B6		0,404	
B7		0,679	
B8		0,778	
B9		0,526	
B3 (rev.)			0,543
B5 (rev.)			0,429
B15 (rev.)			0,756
B16 (rev.)			0,673
B17 (rev.)			0,690
B19 (rev.)			0,525

Source: authors’ own compilation using RStudio; *psych* package (fa() function), Principal Axis Factoring extraction with Promax rotation.

#### Factor interpretation (labels used for modelling)

- Factor 1 – Structural and instructional capacity constraints: This factor reflects perceived shortages in teaching staff and instructional capacity, as well as broader institutional resource and infrastructure limitations and their consequences for educational quality. Higher scores indicate stronger perceptions of system-level constraints affecting learning conditions and preparedness.
- Factor 2 – Mobility and solution orientation: This dimension captures a future-oriented, solution-focused perspective that emphasises international mobility, inter-institutional cooperation, and systemic innovation as responses to capacity pressures. Higher

scores indicate stronger endorsement of mobility- and cooperation-based coping strategies.

- Factor 3 – Lack of student support and personal attention: This factor represents perceived deficits in personalised academic, professional, and emotional support, including limited staff accessibility and individual guidance. Higher scores indicate stronger perceptions of insufficient student-centred support.

Communalities were mostly in an acceptable range (approximately 0.32–0.57), with a few items showing lower but still tolerable values (e.g., B4  $\approx$  0.22; B6  $\approx$  0.25; B18  $\approx$  0.19). These items were retained due to their conceptual relevance and because their inclusion did not affect the clarity of the factor structure. The three-factor model explained approximately 40% of the total variance, which is acceptable for complex attitudinal constructs. Overall, students' perceptions of the higher education capacity crisis are multidimensional and can be described by three related latent dimensions reflecting (1) structural capacity constraints, (2) mobility and solution orientation, and (3) perceived lack of student support.

### 3.2. RQ2 – Identification of student clusters based on factor scores

Standardized factor scores (z-scores) of the three latent dimensions were used as inputs for cluster analysis. Hierarchical clustering using Ward's method and Euclidean distance was first applied to explore the appropriate number of clusters. Inspection of the dendrogram and fusion coefficients indicated that a two-cluster solution was overly heterogeneous, while a four-cluster solution did not yield substantively distinct groups. Accordingly, a three-cluster solution was selected as the most interpretable and stable segmentation.

The hierarchical solution was subsequently refined using K-means clustering (K = 3), which confirmed clear and consistent cluster separation.

**Table 3. Cluster centers (standardized factor scores)**

Cluster	Structural capacity shortage	Lack of student support	Mobility and solutions
1	+0,59	-0,46	+0,89
2	+0,31	+0,89	-0,67
3	-1,16	-0,69	-0,13

Source: own elaboration, RStudio; *stats* package (*kmeans()*), standardized factor scores.

#### Cluster interpretation

##### 1. Crisis Voicers on the Move

This cluster shows above-average perceptions of structural capacity constraints and the strongest endorsement of mobility- and cooperation-based responses, combined with below-average concern

about lack of personal support. The profile reflects a system-critical yet solution-oriented stance focused on mobility and inter-institutional collaboration.

## 2. Mentor-Hunters

Students in this cluster report the highest levels of perceived lack of student support and personal attention, while structural constraints are moderate and mobility orientation is low. The capacity crisis is thus primarily experienced through relational and mentoring deficits.

## 3. Survivors

This cluster scores below average on all three dimensions, indicating low perceived problem salience at both structural and interpersonal levels, possibly reflecting adaptation to existing conditions.

The results demonstrate three differentiated student segments. The clusters vary not only in the intensity of perceived crisis, but also in the *dominant focus* through which the crisis is interpreted (structural constraints, support deficits, or mobility- and solution-oriented perspectives).

### 3.3. RQ3 – Cluster profiling by background variables

Associations between cluster membership and background variables (gender, field of study, and institution type) were tested using contingency tables and Pearson's chi-square tests, with effect sizes assessed using Cramer's V. Gender was not significantly associated with cluster membership ( $\chi^2(4) = 7.98$ ,  $p = 0.092$ ,  $V = 0.089$ ), and field of study also did not reach conventional levels of significance ( $\chi^2(6) = 11.04$ ,  $p = 0.087$ ,  $V \approx 0.10$ ), although the latter suggests trend-level differences that may warrant further investigation in larger or more balanced samples.

In contrast, institution type showed a significant association with cluster membership ( $\chi^2(2) = 11.45$ ,  $p = 0.003$ ,  $V = 0.152$ ). Students from public institutions were more prevalent in clusters characterised by stronger perceptions of structural constraints and support deficits, whereas private-institution students were relatively more prevalent in the Survivors cluster. This indicates that institutional context contributes to differences in perceived capacity-related challenges.

## 4. DISCUSSION

This study examined the higher education capacity crisis from the student perspective. The results show that students do not experience capacity problems as a single, uniform issue. Instead, their perceptions are structured along three related but clearly distinct dimensions, which together form different student profiles. These findings extend system-level approaches by highlighting experiential perception patterns (Oldfield & Baron, 2000; Weerasinghe & Fernando, 2017).

By focusing on student perceptions, the study goes beyond system-level approaches that rely mainly on indicators such as student-staff ratios or funding levels. For students, capacity constraints become visible through everyday learning situations, personal interactions, and access to support or mobility opportunities. In this sense, the capacity crisis appears as a lived experience rather than an abstract structural problem.

The first dimension reflects structural and instructional capacity constraints, linked to overcrowded classes and limited teaching capacity. Students perceive these issues as interconnected problems that affect learning conditions as a whole, rather than as isolated shortages. This is consistent with earlier research showing that students' evaluations of higher education are shaped by interconnected experiences of learning environments and staff availability (Oldfield & Baron, 2000; Weerasinghe & Fernando, 2017; Matus et al., 2021). This supports earlier quality-related findings (Cant et al., 2023; Martin & Bolliger, 2022) while framing them as an integrated capacity constraint.

The second dimension captures the lack of student support and personal attention. Students clearly distinguish between general structural constraints and deficits in personal guidance, mentoring, and staff accessibility. This suggests that capacity problems are experienced not only through material limitations but also through weakened personal relationships within institutions. Unlike prior satisfaction-focused studies (Delnoij et al., 2020; Gehreke et al., 2024; Prananto et al., 2025), this dimension frames support deficits as capacity constraints.

The third dimension highlights mobility and inter-institutional cooperation as coping strategies. Some students interpret capacity constraints in a solution-oriented manner, viewing mobility and cooperation as ways to extend learning opportunities beyond their home institution. However, access to these options is not equal for all students. This aligns with mobility-as-capacity research (Gunter & Raghuram, 2018; Giesenbauer & Müller-Christ, 2020; Csaszar et al., 2023), but from a student coping perspective.

The cluster analysis confirms that students interpret the capacity crisis in different ways. Some emphasise structural problems and mobility-based solutions, others focus mainly on the lack of personal support, while a third group reports low problem intensity across all dimensions. Institutional type plays a role in these differences, while gender and field of study are less relevant.

## **5. CONCLUSION**

This study demonstrates that students perceive the higher education capacity crisis as a multidimensional phenomenon. Their experiences are shaped by structural constraints, the availability of personal support, and

access to mobility and cooperation opportunities. These dimensions combine into distinct student profiles, indicating that capacity problems are interpreted in qualitatively different ways rather than along a single scale.

Overall, the findings highlight that higher education capacity challenges should not be understood only as structural or resource-related issues. From the student perspective, they are also relational and experiential problems that influence everyday learning and institutional engagement. Focusing on student perceptions therefore provides important insights into how capacity constraints are actually experienced in higher education.

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## BRIDGING GENERATIONS THROUGH SOUND: THE POWER OF COMMUNICATION IN MUSIC EDUCATION

*Alois DANĚK*<sup>1</sup>

**Abstract:** *Current educational discourse increasingly points to frictions that emerge when different generations meet within learning environments. In music education, these frictions tend to surface with particular intensity, as musical meaning is inseparable from lived experience, personal histories, and interpretative frameworks that vary across age groups. Drawing on long-term scholarly engagement in music education, this paper examines how communication takes shape among participants of different generations and how music can mediate understanding in contexts marked by divergent expectations. The contribution is situated at the intersection of music pedagogy and related disciplines, without reducing music education to an applied extension of external theories. Attention is directed towards concrete educational situations in which contrasting assumptions about learning, authority, or participation become visible. Such situations are not approached as pedagogical failures but as moments that expose the communicative dynamics inherent to music education. By conceptualising music education as a practice rooted in interaction and attentive listening, the paper argues that music offers conditions for dialogue that extend beyond verbal exchange. The closing discussion considers what this perspective implies for the professional preparation of music educators, particularly with regard to reflective practice and the capacity to work thoughtfully within generationally diverse educational settings.*

**Key words:** *communication, generational diversity, music education, residential childcare, qualitative research*

**JEL Classification:** *I21, I24, I29*

### 1. INTRODUCTION

Educational practice increasingly takes place in contexts shaped by generationally distinct biographies that influence how learning situations are interpreted and negotiated. These differences cannot be reduced to age alone but reflect historically situated patterns of socialisation, shifting relationships to authority, and uneven exposure to technological change. In music education, such divergences often become especially visible. Musical learning is embedded in memory, bodily experience, and culturally formed habits of listening that develop over time within specific social environments. Research on generational diversity in education has frequently relied on broad typologies or managerial frameworks designed to facilitate adaptation. While informative, these approaches tend to

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overlook the fine-grained ways in which communication operates within particular disciplines. Music education provides a contrasting perspective, as communication unfolds through shared musical action, through moments of resonance as well as friction, and through interpretative processes that resist full verbal articulation. Generational difference thus appears less as an abstract category and more as a lived orientation towards musical meaning and educational interaction.

These dynamics are further mediated by the language through which music education is organised. Formal pedagogical settings typically rely on a cultivated discourse that presupposes familiarity with specific modes of expression and tacit norms of interaction. For children growing up in residential childcare, whose everyday communication may be shaped by different linguistic codes and pragmatic conventions, this encounter can involve forms of misalignment that remain largely unspoken. This paper approaches music education as a communicative practice in which generational and linguistic differences are constitutive features rather than peripheral complications. Moments of hesitation or misunderstanding are therefore not treated as indicators of pedagogical failure but as situations in which implicit expectations surrounding participation and communicative competence become visible. Drawing on sustained scholarly engagement in music education, the analysis seeks to clarify how communication extends beyond verbal exchange through interaction, listening, and shared musical practice. At the same time, it remains attentive to the situated nature of educational encounters and to the limits of generalisation, pointing towards the need for further empirical exploration across diverse institutional contexts.

## **2. PROBLEM FORMULATION AND METHODOLOGY**

The contribution builds on long-term research engagement with music education in socially and generationally diverse educational contexts. The central research problem concerns language and communication as often overlooked dimensions of music education, particularly in settings where cultivated pedagogical discourse encounters alternative linguistic codes shaped by different social and institutional experiences. In this paper, attention is directed to communicative situations involving children in residential childcare, whose everyday language practices may differ substantially from those presupposed within formal music education. The research problem is formulated around how these divergent communicative codes influence participation, mutual understanding, and the construction of musical meaning within educational interaction.

From a methodological perspective, the contribution draws selectively on data and analytical insights generated through a series of long-term qualitative research projects in music education. These projects were not initially designed to isolate language as a primary variable, yet recurrent

communicative tensions, misunderstandings, and moments of negotiated meaning prompted a more focused analytical lens. The methodological orientation therefore reflects an iterative research process in which empirical observation and theoretical reflection have developed in dialogue over time.

The methods informing this contribution combine qualitative approaches typical of educational research, including sustained field engagement, reflective observation, and interpretative analysis of educational situations. Given the scope of a conference proceedings paper, the methodological discussion is intentionally selective and illustrative, with an emphasis on analytical orientation rather than comprehensive coverage. The aim is not to present a complete methodological framework but to clarify the analytical perspective through which language and communication are examined in relation to music education practice. The findings presented here should thus be understood as part of a broader research trajectory that will be elaborated in a subsequent, more comprehensive journal article. Within the present contribution, methodology serves primarily to ground the problem formulation and to justify the interpretative claims made, while acknowledging the contextual and situated nature of the evidence on which they rest.

### ***2.1 Research Problem***

The research problem addressed in this contribution focuses on the role of language and communication in music education, particularly in situations where cultivated pedagogical discourse intersects with linguistic codes shaped by specific social and institutional experiences [1]. Music education is often described as operating beyond verbal language, yet educational interaction within this field is organised through implicit norms of expression, expectations surrounding reflection and participation, and culturally grounded ways of articulating musical meaning [2]. In formal educational settings, these communicative conventions commonly reflect dominant pedagogical norms that may not be fully accessible to children growing up in residential childcare, whose everyday language practices tend to follow different pragmatic and interactional logics [3]. The tension that arises in such encounters does not concern musical ability itself but relates to the capacity to orient oneself within the communicative environment of music education. Situations marked by hesitation, silence, resistance, or misinterpretation can thus be read as manifestations of communicative misalignment than as signs of individual deficit [4]. From this perspective, language is approached as a socially situated practice that shapes access to musical meaning and participation, positioning music education as a space in which different communicative worlds converge, with implications for inclusion that have so far received limited attention within music pedagogical research [5].

## **2.2 Methods**

The methodological orientation of this contribution is qualitative and grounded in long-term research engagement with music education across diverse educational contexts, including work with children in residential childcare [6]. The analysis builds on sustained field presence, reflective observation, and interpretative engagement with educational situations in which language and communication emerged as salient, though often implicit, dimensions of practice. Empirical material was generated through repeated contact with educational settings over time, which made it possible to examine communicative patterns, moments of tension, and shifts in interaction within their situational complexity, rather than as isolated occurrences [7].

Language was not defined as an analytical category at the outset of the research. Communicative phenomena were identified through an iterative process in which empirical material was revisited in relation to evolving theoretical reflection and accumulated pedagogical experience [6]. This approach enabled attention to subtle forms of misalignment, hesitation, and negotiation that accompany musical interaction and that may remain obscured within more structured research designs [1, 5]. Given the format of a conference proceedings contribution, the methodological account remains selective. Its aim is to clarify the analytical stance and interpretative logic guiding the study, while situating the presented insights within a broader qualitative research trajectory that will be elaborated through more detailed empirical analysis in a subsequent journal article.

## **3. RESULTS**

The qualitative approach adopted in this research, combined with long-term immersion in residential childcare settings and sustained artistic practice, enabled access to layers of educational interaction that are not readily visible through more distanced or standardised research designs. This dual positioning, as researchers in music education and as practising artists, proved methodologically productive. It allowed communicative processes to be examined not only as objects of analysis but also as lived, relational experiences shaped by trust, familiarity, and shared musical engagement.

Across observed educational situations, communication within music education consistently emerged as a negotiated process, not a stable framework. Children in residential childcare often responded positively to musical activity itself, yet moments of difficulty frequently arose at points where verbal reflection, instruction, or evaluation relied on cultivated pedagogical language. In these moments, musical engagement tended to function as a stabilising element, offering an alternative channel through which participation could be sustained even when verbal communication

faltered. This suggests that music education can temporarily compensate for linguistic misalignment, although it does not dissolve it entirely.

At the same time, the findings indicate that musical activity alone does not automatically produce inclusion. Situations in which educators remained unaware of the linguistic codes shaping their own communication often led to subtle forms of exclusion, expressed through withdrawal, reduced verbal participation, or reliance on nonverbal strategies by children. From a qualitative perspective, these responses are not interpreted as indicators of low motivation or limited ability but as adaptive communicative strategies within a context perceived as linguistically demanding.

The results further point to the importance of reflexivity on the part of music educators. When pedagogical communication became more flexible, whether through altered modes of address, greater tolerance for nonstandard expression, or increased reliance on shared musical practice, interaction tended to shift. Such shifts were neither uniform nor predictable, yet they underline the role of communication as a dynamic component of music education rather than a neutral background condition.

These findings suggest that the problem of language and communication in music education, particularly in residential childcare contexts, cannot be resolved through methodological adjustment alone. Instead, it requires sustained attention to the communicative assumptions embedded in pedagogical practice. While the present contribution offers only a partial and context-bound account, it demonstrates how a qualitative, practice-based perspective can generate insights that are difficult to capture through more detached approaches. These insights provide a foundation for further empirical work and for deeper theoretical elaboration in subsequent publications.

### ***3.1 Communication in Music Education within Residential Childcare Contexts***

Residential childcare represents a specific educational and social environment in which communication is shaped by institutional routines, asymmetrical power relations, and heterogeneous linguistic practices. Children living in these settings often develop communicative strategies that differ markedly from those presupposed in formal educational contexts. These strategies are closely linked to everyday survival within the institution, peer interaction, and prior experiences with authority, rather than to the cultivated pedagogical discourse common in school-based or extracurricular music education [8].

When music education activities are introduced into residential childcare, communication between lecturers and children frequently reveals this discrepancy. Lecturers tend to rely on pedagogical language that assumes shared meanings and culturally sanctioned forms of expression. Phrases

such as "*Now let us tune our instruments*" are typically intended as neutral instructional prompts grounded in musical tradition and educational routine. In practice, however, such expressions may be met with confusion, irony, or resistance. A child's response such as "*Uh, what does 'tune' even mean?*" or "*Tune what, mate?*" does not necessarily signal a lack of interest in music but points to a gap between linguistic codes and assumed knowledge structures [9].

These moments expose the implicit communicative hierarchy embedded in music education. The lecturer's language often reflects an institutionalised musical habitus, while children's responses draw on vernacular speech shaped by peer culture and everyday institutional life. Questions emerging from these interactions, for example "Who is actually the one who understands here?" or "Who decides what counts as proper musical language?", highlight the relational dimension of communication and challenge deficit-oriented interpretations of children's behaviour [10, 11]. What may appear as disruption or disrespect can be more accurately understood as an attempt to renegotiate meaning within a communicative framework that feels unfamiliar or exclusionary.

From an analytical perspective, such exchanges are particularly revealing. They show how music education in residential childcare is not only a matter of musical content but also of linguistic mediation and symbolic power. Communication becomes a site where inclusion is either facilitated or constrained, depending on the lecturer's capacity to recognise and respond to differing communicative codes. Attentiveness to these dynamics does not imply abandoning disciplinary language or lowering expectations. It involves a reflective adjustment of pedagogical communication that acknowledges the specificity of residential childcare while preserving the integrity of music education as a professional field [6].

#### **4. RECOMMENDATIONS FOR PRACTICE**

This contribution has examined language and communication as constitutive, yet frequently underestimated, dimensions of music education, with particular attention to generational diversity and the context of residential childcare. By conceptualising music education as a communicative practice, the analysis has shown how educational interaction is shaped by implicit linguistic norms and differing communicative codes, moving beyond a narrow focus on musical skill development. These dynamics become especially visible in situations where cultivated pedagogical language intersects with forms of expression grounded in distinct social and institutional experiences, revealing how access to musical meaning is mediated through communication.

Drawing on a qualitative perspective informed by long-term research engagement and artistic practice, the findings indicate that music can

support interaction in contexts where verbal communication is uneven or fragile, while underlying communicative tensions remain present. Inclusion within music education appears closely connected to the ability of educators to recognise and critically reflect on the communicative assumptions embedded in their own practice. Moments of hesitation, silence, or resistance are interpreted as signals of broader conditions shaping educational interaction rather than as individual shortcomings. Given the scope of a conference proceedings contribution, these conclusions remain analytically bounded and provisional, serving to clarify a problem that invites further theoretical and empirical inquiry into language and communication in music education across diverse institutional contexts.

## **5. CONCLUSION**

This contribution has examined language and communication as constitutive, yet frequently underestimated, dimensions of music education, with particular attention to generational diversity and the context of residential childcare. By conceptualising music education as a communicative practice, the analysis has highlighted how educational interaction is shaped by implicit linguistic norms and differing communicative codes, extending beyond questions of musical skill development alone. These dynamics become especially apparent in situations where cultivated pedagogical language intersects with forms of expression grounded in distinct social and institutional experiences, revealing how access to musical meaning is mediated through communication.

Drawing on a qualitative perspective informed by long-term research engagement and artistic practice, the findings indicate that music can support interaction in situations where verbal communication is uneven or fragile, without eliminating underlying communicative tensions. Inclusion within music education appears closely linked to the extent to which educators are able to recognise and critically reflect on the communicative assumptions embedded in their own practice. Moments of hesitation, silence, or resistance are thus interpreted as expressions of broader conditions shaping educational interaction, not as individual shortcomings. Given the scope of a conference proceedings contribution, these conclusions remain provisional and analytically bounded. Their purpose is to clarify a problem that invites further theoretical and empirical inquiry, providing a starting point for subsequent research that will explore language and communication in music education across a wider range of contexts while preserving the disciplinary specificity of the field.

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## INNOVATIVE METHODS IN HIGHER EDUCATION THROUGH THE EYES OF GENERATION Z: GENDER DIFFERENCES IN SLOVAKIA

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*Simona KOSÁKOVÁ<sup>2</sup>*

**Abstract:** *Innovative teaching methods play an important role in enhancing the quality of higher education under conditions of rapid technological and social change. The majority of current university students consist of members of Generation Z, whose educational needs require a shift from traditional forms of teaching towards interactive and student-centred approaches. The aim of the study is to specify respondents' attitudes towards innovative educational methods and to verify the existence of gender differences between men and women in Slovakia.*

*The empirical research was conducted in the period from September to November 2025 through an online questionnaire survey. A total of 913 valid responses from university students were included in the analysis, comprising 317 men and 596 women. Respondents' attitudes were examined in three areas: support for innovative teaching methods from the administrative and academic structures of universities, the perceived contribution of innovative approaches to the development of critical thinking and personal growth, and the actual use of innovative teaching methods by instructors. The collected data were processed using descriptive statistics and the non-parametric Mann–Whitney U test. The research results indicate an overall positive perception of innovative teaching methods among Generation Z students. In most cases, respondents agreed that innovative approaches in teaching support the development of critical thinking and personal growth, while administrative and academic support from universities was evaluated as relatively favourable. At the same time, the empirical analysis did not demonstrate the existence of statistically significant gender differences in attitudes towards the examined areas. The findings suggest that Generation Z students' attitudes towards innovative methods in higher education are relatively homogeneous with respect to gender. The study contributes to the expansion of knowledge on the perception of innovative teaching methods in the Slovak higher education environment and highlights the importance of systematic institutional and pedagogical support for innovation in education.*

**Keywords:** innovative teaching methods, higher education, Generation Z, critical thinking, gender differences

**JEL Classification:** I21, I23, I29

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## **1. INTRODUCTION**

Higher education has undergone significant changes in recent years, which are determined by technological development, digitalisation, globalisation, and the growing demands of the knowledge economy. Traditional teaching approaches based on the passive transmission of knowledge and the dominant role of the instructor are increasingly being questioned as insufficient for the development of competencies necessary for graduates' employability in the unpredictable environment of the labour market (Carvalho et al., 2020; Fernandez & Alvarez, 2020; Vasquez & Dominguez, 2020). In response to these challenges, innovative teaching methods have come to the forefront, emphasising active learning, the development of critical thinking, creativity, and the ability to apply knowledge in practice (Ivanova & Ilyashenko, 2020; Fajardo et al., 2020; Popescu & Ionescu, 2021).

The academic literature indicates that innovations in education represent one of the key instruments for enhancing the quality of higher education and its social relevance. Innovative pedagogical approaches enable a better linkage between theoretical knowledge and practical experience, support deeper understanding of the curriculum, and increase the level of student engagement in the educational process (García-López et al., 2020; González & Morales, 2021; Lima & Santos, 2021). Several empirical studies confirm that the use of active and technologically supported forms of teaching leads to higher student satisfaction and a more positive evaluation of the quality of higher education (Gilbert et al., 2021; Nguyen & Le, 2023; Bidarra et al., 2025).

The importance of innovative teaching methods is further accentuated in the context of generational change. The current population of university students is predominantly composed of members of Generation Z, who grew up in an environment of digitalisation, constant access to information, and rapid technological development. These conditions have significantly influenced their educational needs, learning preferences, and expectations towards higher education (Bratu et al., 2023; Erisen & Bavli, 2024). Research suggests that Generation Z students prefer interactive, flexible, and technologically supported forms of teaching that allow active engagement in the learning process, collaboration with others, and immediate feedback (Tan et al., 2022; Belmonte-Almagro & Hernández-Ramos, 2026).

Innovative teaching methods are also considered an effective tool for the development of critical thinking, which is one of the key competencies of the 21st century. Critical thinking enables students to analyse information, evaluate different perspectives, and make informed decisions in complex and ambiguous situations (Shalgimbekova et al., 2023; Knysh et al.,

2023). Methods based on discussion, problem-solving, project-based learning, or experimentation create space for deeper understanding of the subject matter and support the development of students' analytical, argumentative, and reflective abilities (Ramos & Silva, 2023; Hassan & Rahman, 2023; Deng et al., 2025).

However, the implementation of innovative teaching methods is not an automatic process, and its success is conditioned by several contextual factors. A significant role is played by the institutional environment of higher education institutions, particularly administrative and academic support for pedagogical innovation. Several authors point out that systematic support from university management, the availability of technological infrastructure, and opportunities for the pedagogical development of instructors are key prerequisites for the successful implementation of innovative approaches in teaching (López-Martínez & García, 2020; Vakaliuk & Stepanyuk, 2024; Gudoniene et al., 2025). Without these conditions, the use of innovative methods may be inconsistent and dependent on the individual initiative of individual educators (Pereira & Costa, 2022; Nguyen & Le, 2023).

In the academic literature, the issue of gender differences in attitudes towards innovative teaching methods is also increasingly discussed. Some studies suggest that men and women may perceive the use of digital technologies, interactive forms of teaching, or group work differently; however, empirical findings are not conclusive and often vary depending on the cultural and institutional context (Bratu et al., 2023; Erisen & Bavli, 2024). Research focusing on younger generations of students indicates that, in the case of Generation Z, these differences are gradually diminishing, as a shared digital environment and similar educational experiences contribute to the homogenisation of students' attitudes regardless of gender (Tan et al., 2022; Shalgimbekova et al., 2024).

Despite the growing number of studies focusing on innovative teaching methods and the educational needs of Generation Z, there remains a lack of empirical evidence in many national contexts regarding students' attitudes towards these approaches and the existence of gender differences in their perception. In the Slovak higher education environment, this issue remains relatively under-researched, which creates space for further research aimed at identifying factors influencing the perception and use of innovative teaching methods.

The aim of this study is therefore to analyse the attitudes of Generation Z university students towards innovative educational methods and to verify the existence of gender differences between men and women in Slovakia. The research focuses on the perception of institutional support for innovative teaching methods, their contribution to the development of critical thinking and personal growth, and the actual use of innovative

approaches in the teaching process. The study thus contributes to the expansion of knowledge on the educational preferences of Generation Z and provides empirical foundations for the further development of modern higher education.

### **1.1 Literature Review**

The theoretical foundations of this study are based on current research focused on the transformation of higher education under conditions of rapid technological, social, and economic change. Several authors point out that traditional teaching approaches based on the passive transmission of knowledge and the dominant role of the instructor are no longer sufficient for the development of competencies required in the knowledge economy and digital society (Carvalho et al., 2020; Fernandez & Alvarez, 2020; Vasquez & Dominguez, 2020). In this context, innovative teaching methods come to the forefront, emphasising students' active participation, the application of knowledge in practice, the development of critical thinking, and the support of learner autonomy (Ivanova & Ilyashenko, 2020; Fajardo et al., 2020; Popescu & Ionescu, 2021).

In the academic literature, innovative teaching methods are understood as a set of pedagogical approaches that go beyond the framework of traditional instruction and aim at the active involvement of students in the educational process. They include active learning, project-based instruction, problem-based learning, collaborative forms of work, gamification, hybrid and blended learning models, as well as the systematic use of digital technologies and online platforms (García-López et al., 2020; González & Morales, 2021; Lima & Santos, 2021; Bidarra et al., 2025). Empirical studies repeatedly confirm that these approaches increase the level of student engagement, support their intrinsic motivation, and lead to more positive evaluations of the quality of higher education (Gilbert et al., 2021; Pereira & Costa, 2022; Nguyen & Le, 2023).

The issue of innovative teaching methods gains particular importance in relation to the generational structure of the current student population. Higher education is today largely shaped by the needs and expectations of Generation Z, who grew up in an environment of digitalisation, permanent access to information, and rapid technological development. These conditions have significantly influenced their educational preferences, learning styles, and attitudes towards traditional forms of instruction (Bratu et al., 2023; Erisen & Bavli, 2024). Several studies indicate that Generation Z students prefer interactive, flexible, and technologically supported forms of teaching that allow active engagement, collaboration, and immediate feedback (Tan et al., 2022; Belmonte-Almagro & Hernández-Ramos, 2026).

The importance of innovative teaching methods is not limited to increasing student engagement but is also closely related to the development of critical thinking and personal growth. Critical thinking is considered one of the key competencies of the 21st century, enabling individuals to analyse information, evaluate different perspectives, and make informed decisions in complex environments (Shalgimbekova et al., 2023; Knysh et al., 2023). Methods based on discussion, problem-solving, project work, and experimentation create space for deeper understanding of the subject matter and support the development of students' analytical, reflective, and argumentative skills (Ramos & Silva, 2023; Hassan & Rahman, 2023; Deng et al., 2025).

The development of critical thinking is also closely linked to students' personal development. Innovative teaching approaches support self-confidence, autonomy, responsibility for one's own learning, and the ability to collaborate in teams, which are competencies essential for graduates' employability in the labour market (Gilbert et al., 2021; Lima & Santos, 2021). Several authors point out that active forms of instruction contribute to the formation of lifelong learning habits and positively influence students' attitudes towards learning (Popescu & Ionescu, 2021; González & Morales, 2021).

However, the implementation of innovative teaching methods is conditioned by several contextual factors, among which the institutional and academic environment of higher education institutions plays a key role. Successful implementation of pedagogical innovations requires systematic support from university management, the availability of technological infrastructure, opportunities for pedagogical training of instructors, and the creation of an innovation-oriented culture within the institution (López-Martínez & García, 2020; Vakaliuk & Stepanyuk, 2024; Gudoniene et al., 2025). Without adequate institutional support, the implementation of innovative approaches may be inconsistent and dependent on the individual initiative of individual educators (Pereira & Costa, 2022; Nguyen & Le, 2023).

The academic literature also addresses the issue of gender differences in attitudes towards innovative teaching methods. Some studies point to differences in preferences for the use of digital technologies or interactive forms of instruction between men and women; however, the findings are not conclusive and often vary depending on the cultural and institutional context (Bratu et al., 2023; Erisen & Bavli, 2024). Research focused on younger generations of students suggests that, in the case of Generation Z, these differences are gradually diminishing, as a shared digital environment and similar educational experiences contribute to the homogenisation of students' attitudes regardless of gender (Tan et al., 2022; Shalgimbekova et al., 2024).

Based on the above theoretical foundations, it can be concluded that innovative teaching methods represent a significant determinant of the quality of higher education and the formation of Generation Z students' attitudes. The linkage of pedagogical innovations, technological support, the institutional environment, and the gender perspective creates a comprehensive framework for analysing the factors influencing the perception and use of innovative approaches in higher education. Examining these aspects is therefore essential for understanding current trends in higher education and for designing effective strategies for its further development.

## **2. PROBLEM FORMULATION AND METHODOLOGY**

The aim is to specify respondents' attitudes towards innovative educational methods and to verify the existence of gender differences between men and women in Slovakia.

The empirical research focused on the attitudes of Generation Z students was conducted in Slovakia during the period from September to the end of November 2025. Data collection was carried out using the online survey tool Survio. The total number of collected questionnaires was 925; after data verification and the exclusion of incomplete or incorrect responses, 913 valid responses were included in the subsequent analysis. In terms of the gender composition of the sample, 317 men (34.72%) and 596 women (65.28%) participated in the survey.

The research team defined three significant aspects in the area of innovative educational methods, which were subsequently presented to respondents in order to identify their attitudes towards the examined issue:

**Q1:** The administrative and academic structure of my university supports the adoption of innovative teaching methods.

**Q2:** Innovative approaches in teaching support my ability to think critically and develop as a person.

**Q3:** Teachers at my university use innovative teaching methods.

Several hypotheses were formulated in the study:

**H1:** There is no statistically significant gender difference in attitudes towards administrative and academic support for innovative teaching methods.

**H2:** There is no statistically significant gender difference in attitudes towards the impact of innovative teaching methods on critical thinking.

**H3:** There is no statistically significant gender difference in the evaluation of teachers' use of innovative teaching methods.

Respondents' attitudes were measured using a Likert-type response scale (strongly disagree, disagree, neutral, agree, strongly agree). The collected

data were first processed using descriptive statistics, which made it possible to identify basic trends in respondents' attitudes towards the examined statements. Subsequently, an analysis between men and women was conducted in order to verify the existence of gender differences among members of Generation Z.

To test the pre-formulated hypotheses, the non-parametric Mann–Whitney U test was applied, with the level of statistical significance set at 5%. The chosen methodological approach enabled not only the verification of assumptions derived from the descriptive analysis but also the reliable confirmation or rejection of the existence of gender differences in attitudes towards the examined areas. The research results thus contribute to a deeper understanding of the opinions and attitudes of Generation Z students, which influence their perceptions of and interest in higher education.

### 3. FINDINGS

The research results are presented in the following tables.

**Table 1** Responses of respondents to the statement “The administrative and academic structure of my university supports the adoption of innovative teaching methods”

Q1	Male		Female		Total	
	Count	%	Count	%	Count	%
1	7	0.77	2	0.22	9	0.99
2	14	1.53	21	2.30	35	3.83
3	105	11.50	208	22.78	313	34.28
4	150	16.43	294	32.20	444	48.63
5	41	4.49	71	7.78	112	12.27
Total	317	34.72	596	65.28	913	100

Source: own elaboration

Statement Q1 focuses on the evaluation of the administrative and academic structure of universities in relation to creating conditions for the implementation of innovative teaching methods. The results indicate a predominantly positive perception of this area, as 444 respondents expressed agreement, representing 48.63% of the examined sample. At the same time, more than one third of respondents (34.28%) selected a neutral response, which may indicate limited awareness, lack of interest, or uncertainty when assessing this issue.

From the perspective of gender distribution, the response “agree” occurred most frequently among men (16.43%) as well as among women (32.20%). The most pronounced difference in percentage representation between genders was identified precisely for this response, reaching 15.77

percentage points. Based on the overall distribution of responses, it can be concluded that students perceive the administrative and academic structure of their universities as rather favourable and supportive of the implementation of innovative teaching practices.

**Table 2** Responses of respondents to the statement “Innovative approaches in teaching support my ability to think critically and develop as a person”

Q2	Male		Female		Total	
	Count	%	Count	%	Count	%
1	3	0.33	0	0	3	0.33
2	8	0.88	12	1.31	20	2.19
3	63	6.90	93	10.19	156	17.09
4	172	18.84	350	38.34	522	57.17
5	71	7.78	141	15.44	212	23.22
Total	317	34.72	596	65.28	913	100

Source: own elaboration

Statement Q2 focuses on the perception of innovative teaching approaches as a tool supporting the development of students’ critical thinking and personal growth. The overall distribution of responses indicates a strongly positive evaluation, as up to 80.39% of respondents opted for “agree” or “strongly agree” responses.

In terms of gender structure, men predominantly expressed agreement (18.84%), with the proportion of “strongly agree” responses reaching 7.78%. Only a small proportion of male respondents adopted a neutral position (6.90%). A similar trend was observed among women, who in most cases opted for the responses “agree” (38.34%) or “strongly agree” (15.44%). An interesting finding is that no response expressing strong disagreement was recorded in the group of women, whereas such a stance occurred among men, albeit only in isolated cases.

Despite certain differences in the percentage distribution of individual responses between men and women, the overall distribution of responses can be considered comparable. On this basis, the absence of pronounced gender differences in respondents’ attitudes towards the impact of innovative teaching methods on the development of critical thinking and self-development can be assumed. Overall, the results suggest that both men and women perceive the benefits of innovative approaches in education in a very similar manner.

**Table 3** Responses of respondents to the statement “Teachers at my university use innovative teaching methods”

Q3	Male		Female		Total	
	Count	%	Count	%	Count	%
1	4	0.44	6	0.66	10	1.10
2	35	3.83	40	4.38	75	8.21
3	93	10.19	186	20.37	279	30.56
4	150	16.43	298	32.64	448	49.07
5	35	3.83	66	7.23	101	11.06
Total	317	34.72	596	65.28	913	100

Source: own elaboration

Statement Q3 focuses on the evaluation of the actual use of innovative teaching methods in the educational process. Agreement was recorded among 49.07% of respondents, indicating a predominantly positive perception of this area. From the perspective of gender distribution, agreement was expressed by 16.43% of men and 32.64% of women.

An interesting finding is that statement Q3 shows a relatively higher proportion of disagreement compared to the other examined questions. This result may reflect respondents’ real experience with the teaching process at universities. Disagreement with the statement that instructors use innovative teaching methods was expressed by 3.83% of men and 4.38% of women. When comparing attitudes, it can be concluded that members of Generation Z, regardless of gender, evaluate the use of innovative methods in teaching rather positively. At the same time, the increased proportion of neutral responses indicates a certain degree of respondents’ uncertainty or differing personal experiences with the application of innovative approaches within higher education.

To verify the differences identified through descriptive statistics, the Mann–Whitney U test was applied, the results of which are presented in Table 4.

**Table 4** Verification of the existence of gender differences in Slovakia using the Mann–Whitney U test

Statement	U	Z	p-value
Q1	93 197.5	-0.334	0.716
Q2	89 204.0	-1.387	0.120
Q3	90 704.0	-0.992	0.283

Source: own elaboration

U – Mann–Whitney U test statistic

Z – Standardised value of the test statistic

To verify the existence of gender differences in the evaluation of the examined statements, the non-parametric Mann–Whitney U test was applied.

In the case of statement Q1, which focuses on the perception of support for innovative teaching methods from the administrative and academic structures of universities, no statistically significant differences between men and women were identified ( $p = 0.716$ ). Based on this result, hypothesis H1 was not rejected, confirming the absence of gender differences in the evaluation of this area.

Similarly, for statement Q2, reflecting the perception of the impact of innovative teaching methods on the development of critical thinking and personal growth, no statistically significant differences between genders were found ( $p = 0.120$ ). The test result thus confirms that men and women of Generation Z evaluate the benefits of innovative educational approaches in a very similar way. Hypothesis H2 was not rejected.

The last examined statement, Q3, focused on the actual use of innovative teaching methods by instructors. In this case as well, no statistically significant gender difference was demonstrated, as the p-value reached 0.283, which is higher than the selected level of statistical significance  $\alpha = 0.05$ . Therefore, the null hypothesis was not rejected for this statement either.

Overall, it can be concluded that the results of the Mann–Whitney U test did not demonstrate the existence of statistically significant gender differences for any of the examined statements. The findings thus suggest that Generation Z students' attitudes towards innovative methods in higher education are relatively homogeneous with respect to gender.

### **3.1 Discussion**

The main objective was to specify respondents' attitudes towards innovative educational methods and to verify the existence of gender differences between men and women in Slovakia. The results of the empirical research indicate an overall positive perception of innovative teaching methods among Generation Z in Slovakia. In most cases, respondents agreed that innovative approaches in education support the development of critical thinking and personal growth, while at the same time they evaluated the administrative and academic conditions created by universities for the implementation of these methods relatively favourably. These findings suggest that members of Generation Z perceive innovative educational practices as a natural and desirable component of higher

education. This result is consistent with the findings of several authors who point out that Generation Z students perceive innovative teaching methods as an inherent part of modern higher education and associate them with increased engagement and satisfaction with their studies (Tan et al., 2022; Belmonte-Almagro & Hernández-Ramos, 2022; Szilágyi et al., 2024).

From a practical perspective, it is particularly significant that respondents clearly identify the positive impact of innovative teaching methods on the development of critical thinking. This result confirms that modern didactic approaches, such as interactive forms of teaching, project-based learning, or discussion-based methods, are perceived as effective tools for students' personal development. For higher education institutions, this represents a clear signal that investments in innovations in the teaching process are justified and aligned with the expectations of the current generation of students. These findings correspond with the results of previous studies confirming that innovative and active forms of teaching significantly support the development of critical thinking, analytical skills, and personal growth among university students (Belmonte-Almagro & Hernández-Ramos, 2022; Tan et al., 2022; Shalgimbekova et al., 2023).

On the other hand, the relatively high proportion of neutral responses in the evaluation of the actual use of innovative methods by instructors points to a certain degree of uncertainty or differing experiences among respondents. This result may indicate that although innovative methods are declared and supported at the university level, their implementation in everyday teaching may not always be consistent across individual courses or faculties. From a practical standpoint, this represents an important impulse for university management to focus attention not only on strategic documents but also on systematic support for instructors in the application of innovative approaches in practice.

An interesting finding is the absence of statistically significant gender differences in attitudes towards innovative educational methods. The results suggest that both men and women of Generation Z perceive the benefits of innovative teaching practices in a very similar manner. This fact can be interpreted as evidence that innovations in education represent a universal value that transcends gender differences and reflects students' shared expectations regarding the quality and form of higher education. The absence of statistically significant gender differences is consistent with several studies indicating that, in the case of Generation Z, differences in attitudes towards innovative teaching methods are gradually diminishing, particularly as a result of a shared digital environment and similar educational experiences (Tan et al., 2022; Belmonte-Almagro & Hernández-Ramos, 2022; Shalgimbekova et al., 2023).

From a practical perspective, these findings suggest that measures aimed at the development of innovative teaching methods do not need to be differentiated by gender but should target the student population as a whole. At the same time, they point to the need to increase the transparency and visibility of innovative practices in teaching, so that students are aware of their presence and benefits within the educational process.

#### **4. CONCLUSION**

The results of the study indicate positive attitudes of Generation Z university students towards innovative teaching methods. Respondents perceive these approaches as beneficial for the development of critical thinking, personal growth, and the overall quality of education. The findings also suggest that traditional forms of instruction are no longer able to fully respond to the educational needs of contemporary students, and therefore a shift towards interactive, technologically supported, and student-centred approaches is necessary. The results further highlight the importance of institutional and academic support for innovative teaching methods. Although students evaluated support from universities relatively favourably, the observed proportion of neutral responses suggests that the implementation of innovative approaches in everyday pedagogical practice may not always be systematic and consistent. This conclusion is consistent with the findings of international studies, which emphasise that perceived institutional support plays a key role in shaping students' attitudes towards innovative, particularly technologically and digitally supported, forms of learning. Strong support from universities increases students' trust in new teaching approaches and promotes their active engagement in the educational process (Jeilani & Abubakar, 2025).

A particularly significant finding of this study is the absence of statistically significant gender differences in attitudes towards innovative teaching methods. This result suggests that Generation Z represents a relatively homogeneous group in terms of the perception of innovations in education, in which traditional gender differences are gradually diminishing. These findings correspond with research conducted in other countries, which indicates that members of Generation Z exhibit similar educational preferences and attitudes towards learning regardless of gender, especially in the context of digital and technologically mediated education (Fandrejewska et al., 2025). In comparison with studies conducted in specific disciplinary or cultural contexts where gender differences were identified, the results of this study highlight the importance of the national and generational framework when interpreting such differences.

The positive evaluation of innovative teaching methods by Generation Z students is also consistent with research focusing on students' preferences for different forms of instruction. International studies confirm that students of this generation prefer online and blended learning models over traditional forms of teaching, with interactivity, flexibility, and effective use of digital technologies being key factors of their satisfaction (Princes et al., 2024). These findings support the conclusions of this study and further emphasise the need for the systematic development of innovative teaching strategies in higher education institutions.

From a practical perspective, the results suggest that universities should perceive the development of innovative teaching methods as a strategic priority. This includes not only investments in technological infrastructure but also systematic support for the pedagogical development of instructors, the creation of methodological frameworks for the implementation of innovations, and the promotion of a culture of experimentation and pedagogical innovation. Given the homogeneity of Generation Z students' attitudes regardless of gender, these strategies can be designed inclusively and applied broadly, without the need for gender-specific adjustments.

Despite the contribution of this study, its limitations should be acknowledged. The research was conducted within the Slovak higher education environment, which may limit the generalisability of the results to other national and cultural contexts. Future research could focus on international comparisons, longitudinal analyses of changes in students' attitudes over time, or a more detailed examination of the relationship between specific innovative teaching methods and educational outcomes. Despite these limitations, the study provides valuable empirical insights and contributes to the discussion on the modernisation of higher education and its better adaptation to the needs of Generation Z.

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## NEXT-GEN BUSINESS: EVALUATING ATTITUDES TOWARD AI IN SLOVAKIA

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**Abstract:** *The aim of the article is a comparison of attitudes of owners and manager on the AI towards in Slovak business environment in the segment of small and medium-sized enterprises (SMEs). The research was conducted on a sample of 384 owners and managers attitudes within the business environment of the Slovak Republic. Data collection took place in 2025 through an external agency with the CAWI methodology. The questionnaire contains 39 close questions. Hypotheses were verified with Chi-square test and Cramer's V. The empirical results confirmed that the age of owners and managers is a not statistically significant factor which has effect on the evaluation of AI towards in the business environment in SME segment in Slovakia. The findings reveal a moderate level of AI integration within the Slovak SME sector. While 54% of respondents report using AI in recruitment processes, only 46% utilize it to enhance general business performance or for employee feedback and satisfaction monitoring. Notably, the lowest level of agreement (38%) was recorded regarding leadership's active commitment to supporting AI integration in daily workflows, suggesting a gap between technological potential and management's proactivity.*

**Key words:** *small and medium-sized enterprises, attitudes, Gen Z, questionnaire, Slovakia*

**JEL Classification:** *O33, L26, M15, J14, R11.*

### 1. INTRODUCTION

The dominance of small and medium-sized enterprises (SMEs) in the business structure and employment in Slovakia makes their preparedness for digital and AI technology macro-relevant. The monitoring of the performance of SMEs in Slovakia at the EU level shows that there has been a recovery in value-added and employment trends, but SMEs are structurally challenged by the lack of management capacity, capital, and

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expertise, which may hinder the use of advanced digital technology (European Commission, 2025).

In the EU, there is a growing use of AI by enterprises, but it is still uneven, with much greater use in larger enterprises and information-intensive sectors; the most frequently mentioned barriers are skill constraints and issues of applicability and compliance (Eurostat, 2025). The AI gap has specific implications for Slovak SMEs because AI-powered solutions are increasingly the drivers of competitive advantage not only through automation but also through decision-making quality in the most critical business processes, especially talent recruitment, allocation, and feedback cycles. In this scenario, SMEs are likely to adopt AI-powered solutions as modular applications (such as ATS screening functionality, generative AI assistants, and dashboards) rather than integrated proprietary solutions, which raises a specific challenge because, in this case, value creation is not linked to the solution but to its integration into HR processes (Dvorsky, 2025).

### ***1.1 Conceptualisation of AI as a capability in SMEs***

In this AI theoretical framework with which to approach AI would be to view it not only as an investment in technology but as an organizational capability—a set of complementary resources (data, infrastructure, skills, leadership, and routines) that can create value on a consistent basis. Studies published in leading IS/management journals have defined AI capability as a higher-order construct that integrates hard resources (such as IT infrastructure), soft resources (such as data access and governance), and human resources (such as analytics/AI skills), and has shown it to be related to outcomes such as creativity and firm performance (Mikalef & Gupta, 2021). Related research further contends that business value is created by AI when it is integrated into managerial processes and decision rights, rather than being segregated as experimentation or pilot projects (Enholm et al., 2022). Taken together, these theoretical approaches suggest that SMEs will likely derive benefit from AI in human resources management (HRM) when they are able to (a) create or gain access to HR data, (b) develop a minimal level of analytics/AI literacy, and (c) institutionalize AI-enabled routines (such as formalized selection criteria and regularized feedback cycles; Skypalova et al., 2025).

Moreover, empirical evidence also shows that AI capability is related to organizational culture, specifically data-driven culture, to predict performance outcomes. For instance, recent studies published in *Information Systems Frontiers* show that data-driven culture can mediate or condition the relationship between AI capability and firm performance, supporting the argument that managerial mindsets and routines are essential complements to AI investments (Wamba et al., 2024). In SMEs, where decision-making and tacit knowledge are often informal, the shift

towards data-informed HR decisions can be a significant organizational change.

### ***1.2 Determinants of adoption in SMEs: Resources constraints, readiness and diffusion***

Research on SME technology adoption finds adoption to be influenced by internal readiness factors (skills, IT maturity, leadership support), organizational fit factors (process standardization, perceived usefulness), and external pressures (customer needs, regulation, labor market tightness). A systematic review of technology adoption concepts in SMEs illustrates the evolving technological era, that SMEs operate in, where adoption factors and barriers are mutually constitutive, rather than independent variables (Zamani, 2022). Supporting systematic review evidence on Industry 4.0 technology adoption in manufacturing SMEs also points to multi-level factors and the importance of roadmap thinking, sequencing capabilities and maturing them incrementally (Ghobakhloo et al., 2022). These observations are consistent with the experience of many SMEs in HR: AI applications are most feasible in environments where processes are already standardized (e.g., structured interviews, competency grids), and least feasible in environments with ad-hoc workflows.

From a strategic diffusion perspective, the OECD's discussion paper on SME AI adoption points to the existence of diffusion gaps between SMEs and large enterprises, and offers a taxonomy of adopters according to digital maturity, complexity of use, and application scope (OECD, 2025). This is especially pertinent to Slovakia, where many SMEs may be at the 'basic digital' levels (ERP/accounting system adoption, basic HRIS) while at the same time exploring the use of generative AI applications. The implication here is that AI use in HRM needs to be researched not as a 'use'/'non-use' phenomenon but as a maturity continuum from simple augmentation (e.g., preparing job advertisements, summarizing CVs) to embedded decision support (e.g., validated screening criteria, analytics-driven retention strategies).

### ***1.3 AI-Powered HRM: Boyonf automation to augmented decision-making***

In the literature on HRM, a robust theoretical consensus is emerging that AI impacts HR not only through task automation but also through the transformation of decision architecture (who decides, on what basis, with what accountability). A major review in Human Resource Management Review outlines a comprehensive strategic framework for AI-enabled HRM, suggesting that the results emerge at both the employee and organizational levels and depend on the way AI is integrated into HR activities (Malik et al., 2023).

The global literature on HRM also suggests that the adoption of AI raises ethical and governance issues (for example, bias, privacy, and transparency), and that these vary depending on the institutional context and legal system (Budhwar et al., 2022). In the context of SMEs, these considerations may be heightened because formal compliance capacity is weak, vendor-provided solutions are ‘black-boxed,’ and HR functions are more hybrid (owner-manager and administrative staff).

A recent literature review on algorithmic technology in Human Resource Management emphasizes the need to theorize human-algorithm interaction and value creation in algorithmic HR, as this impacts work and HR delivery (Kim et al., 2025). This has implications for SMEs, as AI adoption may enhance speed and consistency, but it may also affect perceptions of fairness and trust if employees view AI as a surveillance system or an authority for decisions.

#### ***1.4 AI in Recruitment and Selection: Efficiency Gains and Ethical Trade-Offs***

Recruitment and selection are some of the most popular starting points for AI implementation because the data is quite structured (CVs, tests, interview transcripts), and there are available tools from vendors. A systematic literature review published in *Personnel Review* contextualizes AI-enabled recruitment and selection as a matter of ethics, highlighting that AI can both perpetuate and magnify biases, and that ethics assessments must take into account not only outcomes but also design, data origins, and decision-making (Mori et al., 2024). At the same time, research in *Human Resource Management Journal* explores algorithmic inclusion and demonstrates how exclusion can occur through data, design, and decision-making, even when the goal of system implementation is to decrease human bias (Kelan, 2024).

For SMEs, the theoretical implication is a dual pathway: AI can reduce hiring frictions (time-to-hire, administrative burden, variability), but AI can also introduce governance requirements—documenting criteria for selection, monitoring disparate impact, and explaining results to candidates and regulators. These requirements are becoming more important in the EU framework, where AI used in employment-related decisions may be classified in higher-risk categories with associated compliance requirements (European Commission, n.d.).

Recent studies in the *International Journal of Human Resource Management* have offered practical perspectives on reducing AI bias in recruitment and selection, indicating that bias reduction is not a technical issue but a socio-technical process that requires stakeholder engagement, auditing, and HR capability building (Soleimani et al., 2025). In the SME context, where vendor solutions are typically employed, the most practical bias reduction strategy may be procedural: retaining human-in-the-loop

review, establishing decision rules, justifying decisions, and periodically auditing outputs for fairness rather than vendor claims.

### ***1.5 AI in Recruitment and Selection: Efficiency Gains and Ethical Trade-Offs***

Recruitment and selection are some of the most popular starting points for AI implementation because the data is quite structured (CVs, tests, interview transcripts), and there are available tools from vendors. A systematic literature review published in *Personnel Review* contextualizes AI-enabled recruitment and selection as a matter of ethics, highlighting that AI can both perpetuate and magnify biases, and that ethics assessments must take into account not only outcomes but also design, data origins, and decision-making (Mori et al., 2024). At the same time, research in *Human Resource Management Journal* explores algorithmic inclusion and demonstrates how exclusion can occur through data, design, and decision-making, even when the goal of system implementation is to decrease human bias (Kelan, 2024).

### ***1.4 Algorithmic HR Decisions, Perceived Fairness, and Employee Trust***

In addition to recruitment, AI affects the way employees are treated in HR decisions (task assignment, performance evaluation, promotion, and scheduling). There is a growing body of literature that suggests employee responses are a function of perceived procedural justice, understandability, and voice. Findings from the *International Journal of Human Resource Management* indicate that perceived fairness of algorithmic HR decisions influences attitudes and outcomes in organizational settings (Jabagi et al., 2025). Even if SMEs are not platform organizations, the process can be generalized: employees will determine if the system is understandable, contestable, and legitimate. The duality of algorithmic management approach also helps to further explain that algorithmic HRM can simultaneously enhance efficiency/value and decrease autonomy, and this can happen simultaneously and depending on implementation decisions (Meijerink & Bondarouk, 2023). This duality is particularly important for SMEs because HRM systems could be implemented with the aim of improving managerial efficiency, but employee perceptions could depend on autonomy, work dignity, and feelings of surveillance.

Therefore, SMEs adopting AI-based HRM could be theoretically expected to experience an adoption- legitimacy trade-off. **People Analytics and AI-Driven Feedback Loops in SMEs** The second significant avenue of AI value creation in HR is people analytics, which applies data about employees to enhance HR-related decisions, retention, learning, and performance. An integrative review in the *Human Resource Development Review* discusses people analytics research and suggests that while maturity is still unbalanced, value realization is dependent on governance, data quality, and building capabilities (Lee & Lee, 2024). From an IS

point of view, a current study in Electronic Markets proposes an integrative framework that connects people analytics to business value creation and points out the difference between technological possibilities and organizational maturity (Bottesch et al., 2025).

The theoretical interest for Slovak SMEs is the possibility of lightweight analytics, where SMEs could begin with structured feedback cycles, pulse surveys, and basic dashboards before moving on to predictive analytics. While AI-powered software can improve feedback cycles by summarizing qualitative feedback, finding trends, informing coaching suggestions, and pointing to early signs of retention issues—privacy concerns (particularly in smaller teams, where anonymity is difficult to maintain) are also introduced. Thus, the theoretical expectation is that the best approach for SMEs is to implement analytics in a phased fashion: (1) digitize HR files, (2) formalize performance standards, (3) establish reporting processes, and only then (4) use AI-powered prediction/optimization. Synthesis: A Socio-Technical Perspective on the Creation of AI Value in Slovak SMEs Through these streams, a uniting theoretical synthesis appears: AI in SME HRM is most appropriately understood as a socio-technical capability whose performance is contingent on (a) complementary organizational resources, (b) governance and compliance, and (c) employee legitimacy.

Research on AI capabilities has found performance contingent on sets of resources and routines (Mikalef & Gupta, 2021; Wamba et al., 2024). Adoption research in SMEs has found that readiness and constraints influence diffusion patterns (Zamani, 2022; OECD, 2025). HRM and ethics research has found trust, fairness, and accountability influence whether AI is viewed as an augmentation or illegitimate control (Malik et al., 2023; Mori et al., 2024; Meijerink & Bondarouk, 2023). In the Slovak SME setting, such processes are likely to be reinforced by scale effects. Small groups imply faster learning and simpler process change, but also increased privacy risks, reduced expert personnel, and greater social sensitivity to automated decisions. Public policy trends in the EU further heighten the relevance of transparent and accountable AI use in the workplace (European Commission, n.d.). Theoretical frameworks and empirical research must therefore conceptualize AI-enabled HR outcomes as conditional: the operational advantages (efficiency, better fit, superior retention) will be greater if and when SMEs build a minimal AI/analytics capability, AI-enabled HR processes, and a governance structure that safeguards fairness, transparency, and employee voice.

## **2. AIM, METHODOLOGY, AND DATA COLLECTION**

The aim of the article is a comparison of attitudes of owners and manager on the AI towards in Slovak business environment in the segment of small and medium-sized enterprises.

Data collection was conducted in 2025 by an external agency using the CAWI (Computer-Assisted Web Interviewing) methodology. The respondent was defined as an owner or top manager of an SME operating within the business environment of the Slovak Republic.

### **2.1. Statements in the questionnaire**

The survey consisted of 39 questions, organized into several comprehensive sections: demographic questions, human resource management, financial performance, business management, corporate social responsibility (CSR), and business sustainability. A 5-point Likert scale was employed to evaluate statements regarding the use of AI in the SME business environment: 1 – strongly disagree, 2 – disagree, 3 – neither agree nor disagree, 4 – agree, and 5 – strongly agree.

Statements on the topic of AI are as follows: S\_AI1: Our organization leverages AI capabilities to enhance business performance. S\_AI2: The enterprise utilizes AI in recruitment processes (e.g., resume screening, candidate evaluation, and predicting candidate success based on historical data). S\_AI3: The enterprise employs AI to collect feedback, gauge employee satisfaction, and gather recommendations or advice from its workforce. S\_AI4: The organization's leadership is actively committed to supporting the integration of AI into employees' daily work activities.

### **2.2. Hypotheses formulation and statistical methods**

To achieve the primary objective of this article, the following scientific hypothesis was formulated:

H: There are statistically significant differences in attitudes toward AI (H1: S\_AI1, H2: S\_AI2, H3: S\_AI3, H4: S\_AI4) among business owners and managers based on their age.

To evaluate the scientific hypotheses, descriptive statistical tools were employed, including absolute and relative frequencies of statistical variables, as well as univariate and bivariate frequency distributions. The assumption of normal distribution was confirmed for each AI statements (S\_AI1, ..., S\_AI4). Differences between selected groups of respondents were assessed using contingency tables, the Chi-square test, and Cramer's V.

### **2.3. Structure of respondents**

Structure of respondents (n = 384, 100%) according to the demographics characteristics is as follows: gender: 187 (48.7%) male, 197 (51.3%) female; size of enterprise: 166 (43.2%) micro-enterprise, 100 (26.0%) small enterprise, 118 (30.8%) medium-sized enterprise; position of respondents in business: 161 (41.9%) owner, 223 (58.1%) manager; family entrepreneurship: 125 (32.5%) yes, 251 (65.4%) no, 8 (2.1%) I don't know; time period in business: 57 (14.8%) less than 5 years, 206

(53.7%) from equal and more than 5 years to less than 20 years, 121 (31.5%) more than 20 years.

### 3. EMPIRICAL RESULTS

Table 1 evaluates respondent attitudes toward using AI to enhance business performance.

**Table 1: Evaluation of S\_AI1 statement according to the age of respondents**

S_AI1 statement	Total		GEN Y + Z		GEN BB + X	
	n	%	n	%	n	%
A1 + A2	176	45.8%	99	43.8%	77	48.7%
A3	129	33.6%	72	31.9%	57	36.1%
A4 + A5	79	20.6%	55	24.3%	24	15.2%
<b>Total</b>	<b>384</b>	<b>100.0%</b>	<b>226</b>	<b>100.0%</b>	<b>158</b>	<b>100.0%</b>

Note: BB – Baby boom. Source: author’s calculations.

The results of statistical test (based on table 1): Pearson chi-square test = 4.767, degree of freedom = 2, p-value = 0.092, Cramer’s V = 0.111. Respondent age is not a statistically significant factor influencing the evaluation of S\_AI1. Therefore, statistical hypothesis H1 is rejected.

Table 2 evaluates respondent attitudes toward AI-driven recruitment, including screening and candidate success prediction.

**Table 2: Evaluation of S\_AI2 statement according to the age of respondents**

S_AI2 statement	Total		GEN Y + Z		GEN BB + X	
	n	%	n	%	n	%
A1 + A2	206	53.6%	116	51.3%	90	53.6%
A3	93	24.2%	55	24.3%	38	24.2%
A4 + A5	85	22.1%	55	24.3%	30	22.1%
<b>Total</b>	<b>384</b>	<b>100.0%</b>	<b>226</b>	<b>100.0%</b>	<b>158</b>	<b>100.0%</b>

Note: BB – Baby boom. Source: author’s calculations.

The results of statistical test (based on table 2): Pearson chi-square test = 1.755, degree of freedom = 2, p-value = 0.416, Cramer’s V = 0.068. Respondent age is not a statistically significant factor influencing the evaluation of S\_AI2. Therefore, statistical hypothesis H2 is rejected.

Table 3 evaluates respondent attitudes toward using AI for employee feedback and satisfaction monitoring.

**Table 3: Evaluation of S\_AI3 statement according to the age of respondents**

S_AI3 statement	Total		GEN Y + Z		GEN BB + X	
	n	%	n	%	n	%
A1 + A2	179	46.6%	105	46.5%	74	46.6%
A3	103	26.8%	56	24.8%	47	26.8%
A4 + A5	102	26.6%	65	28.8%	37	26.6%
<b>Total</b>	<b>384</b>	<b>100.0%</b>	<b>226</b>	<b>100.0%</b>	<b>158</b>	<b>100.0%</b>

Note: BB – Baby boom. Source: author’s calculations.

The results of statistical test (based on table 3): Pearson chi-square test = 1.858, degree of freedom = 2, p-value = 0.395, Cramer's V = 0.070. Respondent age is not a statistically significant factor influencing the evaluation of S\_AI3. Therefore, statistical hypothesis H3 is rejected.

Table 4 evaluates respondent attitudes toward leadership commitment to AI integration in daily work.

**Table 4: Evaluation of S\_AI4 statement according to the age of respondents**

S_AI4 statement	Total		GEN Y + Z		GEN BB + X	
	n	%	n	%	n	%
A1 + A2	145	37.8%	89	39.4%	56	37.8%
A3	129	33.6%	74	32.7%	55	33.6%
A4 + A5	110	28.6%	63	27.9%	47	28.6%
<b>Total</b>	<b>384</b>	<b>100.0%</b>	<b>226</b>	<b>100.0%</b>	<b>158</b>	<b>100.0%</b>

Note: BB – Baby boom. Source: author's calculations.

The results of statistical test (based on table 4): Pearson chi-square test = 0.614, degree of freedom = 2, p-value = 0.736, Cramer's V = 0.040. Respondent age is not a statistically significant factor influencing the evaluation of S\_AI4. Therefore, statistical hypothesis H4 is rejected.

#### 4. CONCLUSION

The aim of this article was to compare the attitudes of owners and managers toward AI within the Slovak SME segment.

Empirical research findings confirmed that more than 50% of SME owners and managers use AI-driven recruitment, including screening and candidate success prediction. An interesting finding is that business owners and managers from the Baby Boomer and Generation X cohorts (48.7%) utilize AI to enhance business performance to a greater extent than those from Generations Y and Z (43.8%). However, the results did not demonstrate significant intergenerational differences in respondents' attitudes toward the use of AI in business practice.

The quantitative research focused exclusively on the SME segment, which is characterized by limited financial resources. Furthermore, the study was conducted within a single country. While the sample size met the minimum acceptance threshold (n = 384 SMEs), replicating the research on a different sample of SMEs would be advisable to validate the findings. In the future, research activities will focus on the utilization of AI in business risk management and its role in strategic enterprise management.

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## SUSTAINABILITY IN THE AI ERA: CHALLENGES AND DIRECTIONS FOR EDUCATING THE YOUNGEST GENERATION OF WORKERS IN THE LABOR MARKET

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**Abstract:** *The paper examines how sustainability principles can be integrated into AI-driven workforce development, with a focus on the competencies required for sustainable employability and the challenges faced by young workers entering the labour market. Based on a literature review, the findings show that a balanced combination of digital, cognitive, soft, and ethical skills—supported by adaptability and lifelong learning—is essential for individuals to remain employable in rapidly changing work environments. The analysis identifies significant obstacles limiting young workers' preparation, including persistent skill gaps, unequal access to quality education, socio-cultural barriers, and systemic misalignment between training provision and labour market needs. The study further highlights that integrating sustainability into AI-driven workforce development requires responsible AI governance, green human resource management practices, continuous learning infrastructures, and strong stakeholder collaboration. Overall, the paper underscores that sustainable workforce development in the AI era is both a technological and ethical challenge, requiring coordinated and future-oriented strategies to support long-term resilience, equity, and employability.*

**Key words:** *labor market, generation Z, sustainability, work*

**JEL Classification:** *J0, M54, M14*

### 1. INTRODUCTION

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Sustainability is a topic that resonates not only within the environmental sphere but increasingly permeates social, fiscal, and labor-market domains. This also leads to regulatory developments across individual economies. Within the European Union, several key legislative frameworks can be highlighted, including the following examples: i) The European Green Deal, which aims to transform the EU into a climate-neutral economy by 2050 and shapes labor-market policies by promoting green jobs, reskilling, and sustainability-oriented transitions. ii) The Directive on Adequate Minimum Wages (2022/2041), enhancing sustainability in the social dimension by promoting decent working conditions and reducing in-work poverty. iii) The Work-Life Balance Directive (2019/1158), aimed at improving gender equality and sustainable labor-market participation through flexible working arrangements and care-related protections.

It is therefore a logical continuation to concentrate on Sustainability in the AI era: Challenges and directions for educating the youngest generation of workers in the labor market. Artificial intelligence is reshaping economic structures (Bachir, B. M., Adel, Z., & Ahmed, N. 2023) and redefining the competencies required for sustainable employability (Ahmad, B., & Bilal, S., 2024). The intersection of rapid technological advancement and sustainability-oriented regulation places increasing pressure on education systems, employers, and public institutions to prepare young individuals for a labor market that demands both digital proficiency and socially responsible, ethical decision-making.

The youngest generation entering the workforce—Generation Z and the emerging Generation Alpha—will face a context characterised by accelerated automation, the necessity of lifelong learning, and rising expectations regarding environmental and social responsibility.

**The objective of this paper is to identify the key challenges associated with preparing the youngest generation of workers for an AI-driven labor market and to propose directions for developing educational approaches that support their sustainable and resilient employability.** The method used to achieve the aim of this paper is a literature review.

To achieve this objective, there are three research questions:

**Q1** What competencies are critical for sustainable employability in the AI era?

**Q2** What obstacles limit in preparing / education / learning young workers?

**Q3** How can sustainability principles be integrated into AI-driven workforce development?

## 2. CONCEPTUAL AND THEORETICAL BACKGROUND

The following chapter contains definitions of key terms.

### *2.1 Sustainability frameworks relevant to AI and education of employees*

Sustainability in workforce development is increasingly understood through the ESG framework, which links environmental protection, social well-being, and responsible governance. (PwC, 2025) In the context of AI, sustainability also refers to the capacity of organisations and societies to adapt to technological change in a way that promotes equity, long-term employability, and ethical use of data and digital systems. (Ahmad, B., & Bilal, S. , 2024, Volha Litvinets 2024).

International frameworks such as the **United Nations Sustainable Development Goals (SDGs)**—particularly SDG 4 (Quality Education) and SDG 8 (Decent Work)—highlight the need for inclusive skill development and responsible technological transformation (UN, 2015). In the European Union, sustainability is embedded in policies such as the **European Green Deal** (European Commission, 2019), the **Just Transition Mechanism**, and the **Corporate Sustainability Reporting Directive (CSRD)**, which emphasise social impacts, workforce transitions, and the importance of lifelong learning. UNESCO (2021) further stresses that education systems must prepare future workers for ethical challenges, digital inequalities, and the need for continuous skill renewal in an AI-driven environment.

### *2.2. Characteristics of the youngest generation entering the labor market*

The youngest labour-market entrants—**Generation Z** and the emerging **Generation Alpha**—exhibit strong digital confidence, preference for personalised and flexible learning, and a clear expectation that employers act responsibly in social and environmental matters. Research, however, indicates that high digital fluency does not automatically translate into **AI literacy**. Younger cohorts often lack understanding of algorithmic decision-making, data ethics, and the socio-economic consequences of automation (OECD, 2021).

At the same time, these generations place increased importance on well-being, mental health, meaningful work, and opportunities for personal development (ILO, 2020). Their learning behaviour is influenced by continuous online exposure, which shapes their attention patterns, communication styles, and expectations regarding immediacy and interactivity. Generation Alpha, raised entirely in an AI-mediated environment, is expected to extend these trends even further, reinforcing the need for educational systems that combine digital proficiency with strong social, emotional, and ethical competencies.

### 2.3. AI-driven transformation of labor markets

Artificial intelligence is transforming labour markets by automating routine tasks, augmenting complex decision-making, and creating new occupations within digital, analytical, and creative fields. These changes are reshaping the competency profiles required for sustainable employability. Workers increasingly need adaptability, digital and AI literacy, critical thinking, and ethical judgement (IMF, 2024; OECD, 2023).

The impact of AI is uneven across sectors: jobs with a high share of repetitive tasks face higher automation risks, while roles grounded in creativity, communication, and interpersonal skills are becoming more valuable. At the organisational level, AI-enabled systems are reshaping management practices through algorithmic scheduling, performance analytics, and predictive decision-making. These developments introduce new challenges related to fairness, transparency, and workers' autonomy (EU-OSHA, 2022).

As labour markets continue to evolve, sustainable employability depends not only on individual skill acquisition but also on institutions' ability to provide inclusive, accessible, and ethically grounded learning opportunities.

## 3. PROBLEM SOLUTION

The following chapter answers research questions based on our own literature review. Subsequently, based on the results of the literature review, key findings and their consequences are summarized.

**Q1** What competencies are critical for sustainable employability in the AI era?

**Table 1: Core Competencies Identified Across Research**

Competency Area	Key Skills/Attributes	Source(s)
Digital & Data Skills	Digital literacy, data analysis, AI tool proficiency, cybersecurity	Jaiswal, A., Arun, C., & Varma, A. (2021)., Santana, M., & Díaz-Fernández, M. (2022)., Babashahi, L. et al (2024)., Ramos, H., Caro, O., Bardales, E., Huatangari, L., Trigo, J., Guevara, J., & Santos, R. (2025)., Sousa, M., & Wilks, D.

		(2018).
Cognitive Skills	Complex problem-solving, critical thinking, systems thinking, decision-making	Jaiswal, A., Arun, C., & Varma, A. (2021)., Santana, M., & Díaz-Fernández, M. (2022)., Babashahi, L. et al (2024)., Călinescu, G., & Tanașciuc, M. (2024)., Sousa, M., & Wilks, D. (2018).
Soft Skills	Communication, collaboration, emotional intelligence, adaptability, creativity, empathy	Jaiswal, A., Arun, C., & Varma, A. (2021)., Santana, M., & Díaz-Fernández, M. (2022)., Babashahi, L., Babashahi, L. et al (2024)., Imran, N., & Rasheed, R. (2025)., Călinescu, G., & Tanașciuc, M. (2024).
Continuous Learning	Lifelong learning, self-efficacy, openness to change, proactive skill development	Jaiswal, A., Arun, C., & Varma, A. (2021)., Babashahi, L. et al (2024)., Ramos, H., Caro, O., Bardales, E., Huatangari, L., Trigoso, J., Guevara, J., & Santos, R. (2025)., Călinescu, G., & Tanașciuc, M. (2024).
Ethical & Leadership	Ethical reasoning, responsible AI use, leadership, teamwork, cross-functional skills	Santana, M., & Díaz-Fernández, M. (2022)., Babashahi, L. et al (2024)., Imran, N., & Rasheed, R. (2025)., Bock, T., & Von Der Oelsnitz, D. (2025)., Sousa, M., & Wilks, D. (2018).

Source: Literature review

To remain sustainably employable in the AI era, individuals must cultivate a balanced portfolio of digital, cognitive, and soft skills, with a strong emphasis on adaptability and lifelong learning. These competencies not only future-proof careers but also enable meaningful collaboration with AI and other humans in dynamic work environments.

**Q2** What obstacles limit in preparing / education / learning young workers?

Key obstacles limiting the preparation, education, and learning of young workers include skill gaps, access barriers, misalignment with labor market needs, and socio-cultural challenges.

**Table 2: Key Obstacles to Young Worker Preparation**

Obstacle Type	Description/Examples	Source(s)
Skill Gaps	Deficits in communication, digital, and critical thinking skills	Kocsis, Z., & Pusztai, G. (2025), Janyam, K. (2023).
Access & Affordability	Limited access to quality education, high costs, digital divide	Sharma, S., & P. (2023), Costan, E. et al (2021), Thomas, S. et al (2024)
Socio-Cultural Barriers	Discrimination, low VET prestige, lack of inclusiveness	Thomas, S. et al (2024), Bergsens, B., Degler, E., & Lüthi, S. (2019).
Systemic/Policy Challenges	Outdated curricula, restrictive policies, weak stakeholder collaboration	Sharma, S., & P. (2023), Costan, E. et al (2021), Thomas, S. et al (2024)

Source: Literature review

### Major Obstacles Identified

#### 1. Skill Gaps and Mismatches

Young workers often lack essential 21st-century skills such as communication, digital literacy, critical thinking, and creativity, which employers highly value. This gap is consistently observed across different regions and education levels, limiting employability and workplace readiness.

There is a persistent mismatch between the skills taught in educational institutions and those demanded by rapidly evolving job markets, leading to underemployment and unemployment.

#### 2. Accessibility and Affordability

Barriers such as limited access to quality education, training resources, and digital infrastructure disproportionately affect marginalized and low-income youth, especially in rural or underserved areas.

#### 3. Socio-Cultural and Institutional Barriers

Low prestige and attractiveness of vocational education, outdated teaching methods, and insufficient collaboration between educational institutions and employers reduce the effectiveness of training.

#### 4. Systemic and Policy Challenges

Restrictive policies, bureaucratic hurdles, and slow adaptation of curricula to new labor market realities impede the development of relevant skills.

Lack of collaboration between stakeholders (educators, employers, policymakers) and insufficient investment in human capital and digital transformation are recurring issues.

**Q3** How can sustainability principles be integrated into AI-driven workforce development?

Integrating sustainability into AI-driven workforce development requires aligning technological innovation with environmental, social, and ethical values. Based on literature review the most effective approaches combine green human resource management (GHRM), ethical AI practices, continuous learning, and stakeholder engagement to ensure that workforce development supports long-term sustainability goals.

Core Strategies for Integration

##### **1. Green Human Resource Management (GHRM) and Equity**

AI can enhance GHRM by enabling personalized green training, identifying and nurturing environmentally conscious talent, and streamlining HR processes to reduce resource waste (Singh, R., Dissanayake, H., Nainanayake, D., & Kumar, V., 2025, Reddy, M., Deepthi, S., Bhattaru, S., Srilakshmi, V., & Singh, H., 2024). Embedding equity principles ensures inclusive access to skills development and fair distribution of sustainability benefits, fostering employee engagement and commitment to sustainability (Reddy, M., Deepthi, S., Bhattaru, S., Srilakshmi, V., & Singh, H., 2024)

##### **2. Ethical, Responsible, and Socially Aligned AI**

Integrate ethical frameworks (e.g., transparency, accountability, inclusivity) into AI systems to prevent bias and support responsible workforce development (Chang, Y., & Ke, J., 2023). Align AI initiatives with corporate social responsibility (CSR), environmental, social, and governance (ESG) standards, and the UN Sustainable Development Goals (SDGs) (Chang, Y., & Ke, J., 2023).

##### **3. Continuous Learning and Adaptability**

Invest in ongoing workforce training in data science, machine learning, and ethical AI, fostering a culture of innovation and adaptability (Abulibdeh, A., Zaidan, E., & Abulibdeh, R., 2024). Use AI-driven analytics to personalize learning, monitor progress, and identify skill gaps, ensuring the workforce evolves with sustainability needs

#### **4. Stakeholder Engagement and Organizational Alignment**

Engage multiple stakeholders (internal and external) to co-create sustainable AI strategies and ensure broad buy-in. Align AI-driven workforce initiatives with organizational sustainability objectives, supported by leadership and robust change management. (Schwaeke, J., Gerlich, C., Nguyen, H., Kanbach, D., & Gast, J., 2025)

#### **4. RESULTS AND DISCUSSION**

The results of the literature review show a strong convergence across sources regarding the competencies required for sustainable employability in the AI era. Digital and data literacy, cognitive capabilities, and soft skills consistently emerge as the most critical areas. Importantly, the findings indicate that these competencies do not function in isolation; instead, sustainable employability depends on their integration, complemented by adaptability and continuous learning. This suggests that organisations and educational systems should shift from teaching isolated skill sets toward fostering holistic competency portfolios that prepare individuals not only to work with AI but also to navigate fast-changing labour markets.

The analysis of obstacles limiting young workers' preparation reveals persistent structural and systemic issues. Skill gaps remain widespread, particularly in digital literacy, communication, and critical thinking, while many educational programmes still fail to reflect current labour market needs. At the same time, accessibility challenges—such as unequal access to quality education, high training costs, and digital divides—contribute to disparities in employability outcomes. Socio-cultural barriers, including low prestige of vocational pathways and outdated pedagogical approaches, further slow the development of relevant skills. These findings indicate that improving young workers' readiness for the AI-driven economy requires coordinated action across stakeholders, combining curriculum reform, targeted investment, and inclusive education policies.

Finally, approaches for integrating sustainability principles into AI-driven workforce development highlight the importance of aligning technological innovation with ethical, environmental, and social considerations. The literature emphasises that AI can support sustainable practices—such as through green HRM, personalised learning, or analytics-enabled workforce planning—but only when guided by transparent and responsible governance frameworks. Organisations that embed ethical AI, continuous learning infrastructure, and stakeholder collaboration are better positioned to leverage AI not merely for efficiency, but for long-term resilience, equity, and social value creation. Overall, the findings suggest that sustainable workforce development in the AI era requires a dual focus:

strengthening human capabilities while ensuring that AI systems are designed and deployed responsibly.

#### 4. CONCLUSION

The paper demonstrates that sustainable employability in the AI era depends on a balanced integration of digital, cognitive, and soft skills, reinforced by adaptability and continuous learning. The literature consistently shows that young workers face persistent skill gaps, unequal access to learning opportunities, and systemic barriers that limit their readiness for an AI-driven labour market. Addressing these obstacles requires coordinated efforts across educational institutions, employers, and policymakers to ensure that workforce development aligns with evolving technological and sustainability demands.

At the same time, integrating sustainability principles into AI-driven workforce development highlights the need for ethical, transparent, and socially responsible AI practices. Organisations that embed green HRM, responsible governance frameworks, and personalised learning systems are better equipped to support long-term employability and resilience. Overall, the findings underline that sustainable workforce development in the AI era is not solely a technological challenge, but a strategic and ethical imperative requiring holistic, collaborative, and future-oriented approaches.

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## THEATRICAL PERFORMANCE AS A TOOL FOR PRIMARY PREVENTION OF MENTAL HEALTH DIFFICULTIES IN GENERATION Z

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**Abstract:** *The prevention of mental health difficulties among adolescents represents one of the key challenges of contemporary pedagogical and psychological practice. Generation Z faces an increased risk of stress, anxiety, and other psychosocial difficulties, while traditional forms of prevention often struggle with low levels of engagement from the target group. This article presents an innovative preventive approach—a theatrical performance that, through six authentic stories of young people, opens topics related to mental health, relationships, self-concept, and coping with challenging situations. The program includes a moderated discussion with experts (psychologists, coaches, mentors), which allows students to ask questions, share experiences, and obtain professional information in a safe environment. The article focuses on the importance of primary prevention in the field of mental health and on the need to seek effective, interactive, and youth-friendly forms of communication that promote openness and the destigmatization of mental health difficulties.*

**Key words:** *primary prevention, mental health, Generation Z, theatre-based intervention, student engagement*

**JEL Classification:** *A00; I0; I1*

### 1. INTRODUCTION

The growing psychosocial burden among adolescents and the need to identify effective ways of supporting mental health place increasing pressure on schools and professionals to develop new formats of primary prevention. Traditional preventive approaches, however, often struggle with low levels of active student engagement, which reduces their effectiveness—particularly among Generation Z, who value authenticity, interactivity, and opportunities for participation. A theatrical format addressing mental-health topics represents one of the innovative approaches that can meet these expectations.

The theatrical production *Doomed Generation Z* combines narrative portrayals of authentic youth stories with a subsequent expert-led discussion, linking an emotionally powerful cultural experience with

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opportunities for reflection and dialogue. This format is assumed to activate psychosocial mechanisms while contributing to the destigmatization of mental-health difficulties. Nevertheless, it remains unclear to what extent this type of prevention genuinely leads to active student engagement—an element that, according to current evidence, is one of the key conditions for the effectiveness of school-based preventive programmes.

The aim of the present study is therefore to determine the extent to which the theatrical performance and the follow-up expert discussion activate students and whether the anonymous submission of questions via a QR code serves as an effective participatory tool. The research focuses on a quantitative analysis of the number of reactions and their thematic relevance to mental health. The findings aim to contribute to a better understanding of the possibilities and limitations of theatre-based approaches in school prevention and may inform the development of subsequent programmes or methodological recommendations for schools.

## **2. CONTEXT AND BACKGROUND**

### ***2.1 Adolescent Mental Health***

Across the European region, elevated mental-health burdens among young people persist. The WHO reports that half of all mental disorders emerge by the end of adolescence and that a significant proportion of young people have unmet care needs, with suicide ranking among the three most common causes of death in this age group. The OECD likewise indicates that symptoms of anxiety and depression have remained above pre-pandemic levels in many countries, increasing the need for accessible prevention within everyday school environments. UNICEF estimates that approximately 13% of children and young people up to the age of 19 in the EU live with a mental disorder; barriers to accessing care include waiting times, costs, and stigma (OECD, 2023).

### ***2.2 Characteristics of Generation Z***

Generation Z is most commonly defined as those born between 1995–2009 (McCrindle, 2018) or 1996–2009 (Sladek & Grabinger, 2018). The argument for the later starting point is that individuals born in 1996 or later did not experience the world before September 11, 2001, and therefore perceive it within the framework of global terrorism. Their development has also been shaped by the climate crisis, economic instability (Sladek & Grabinger, 2018), and more recently the pandemic (Lyon, 2021). In their value and adaptation patterns, this cohort is sometimes compared to the “Builders” generation (born 1925–1945), as both groups were socialized during overlapping crises and are expected to show a strong orientation toward restoration (McCrindle, 2018).

Generation Z grows up in the context of population ageing, low birth rates, and changing family structures (e.g., increased prevalence of partnered and single-person households, greater involvement of fathers in caregiving) (McCrindle, 2018; Sladek, 2018). Parents—predominantly Generation X—tend to foster individualism, realism, and the pursuit of non-traditional educational pathways (Sladek & Grabinger, 2018). In terms of education, Gen Z is the most highly educated generation to date, with a markedly higher proportion of university graduates than Generations X and Y (McCrindle, 2018).

A key psychological characteristic of this cohort is digital integration: Gen Z teenagers do not perceive a sharp boundary between online and offline worlds; technologies function as an “extension of the self” and serve as the primary platform for information, communication, and identity (Sladek & Grabinger, 2018; McCrindle, 2018). They are online daily (some for more than 10 hours per day), and a high percentage possess a smart device already in preadolescence (Sladek & Grabinger, 2018). This constant connectivity fosters a global orientation—cultural content, norms, and peer influences circulate transnationally and at high speed (McCrindle, 2018; Sladek & Grabinger, 2018).

In the literature, Generation Z is portrayed as “materially saturated, technologically fulfilled, globally connected, and the longest formally educated” (McCrindle, 2018). They are often described as financially literate and cautious (having “learned from crisis”), realistic and critical thinkers, and individualistic yet willing to stand out or engage in entrepreneurship (Sladek & Grabinger, 2018). A strong prosocial and pro-environmental motivation is also emphasized—most young people want their work to have a positive impact on the world (Sladek, 2018).

International population surveys suggest an ambivalent role of digital media: while digital platforms support connectivity and self-expression, they are also associated with frequent experiences of FOMO and concerns about body image. The relationship between social networks and mental health is complex rather than causal. Although social-media use is not unique to Gen Z, this group reports poorer mental health more often, which underscores the importance of interventions that combine authenticity, dialogue, and participation (McKinsey Health Institute, 2023).

### **3. PROBLEM SCHOOL-BASED PRIMARY PREVENTION**

Meta-analyses of school-based interventions show small but consistent effects across socio-emotional and mental-health outcomes, with stronger impacts typically observed in targeted (selective/indicated) programmes compared to universal ones (Werner-Seidler, 2017). Whole-school approaches have demonstrated significant reductions in cyberbullying and smoking, yet findings regarding anxiety and depression remain

inconclusive—often due to implementation challenges and insufficient sensitivity to local needs. At the same time, evidence is growing that school programmes can strengthen resilience (Cai et al., 2025). This leads to two key conclusions: (a) prevention has a clear and justified place in schools, and (b) there is a need for formats that promote higher engagement and reduce stigma (Lemberger-Truelove et al., 2026).

### ***3.1 Effective Primary Prevention***

A key condition for effective primary prevention is the active involvement of students in the programme. Research repeatedly shows that passive, lecture-based formats have very limited impact, particularly in changing attitudes, behaviour, and motivation among adolescents, whereas interventions that incorporate interactivity, experiential elements, and participation lead to greater emotional engagement, better internalisation of messages, and strengthened competencies. Studies on drama-based and theatre-based work with youth confirm these effects, demonstrating improvements in communication, empathy, self-efficacy, and social connectedness (D'Andrea & D'Ulizia, 2025; Oliver et al., 2025). Active participation is therefore not merely a methodological enhancement but a fundamental prerequisite for ensuring that preventive programmes genuinely reach the target group and support changes in attitudes and behaviour.

According to Martanová (2012), effective primary prevention of risk behaviour is based on several interrelated principles that collectively determine the quality and impact of preventive programmes. A central principle is comprehensiveness, meaning that the programme should influence the target group across multiple contexts through coordinated cooperation between the school, family, and media, since only multi-layered approaches can meaningfully shape attitudes and behaviour over time. Closely tied to this is continuity and systematisation, emphasising the need for long-term, sequential, and deliberately planned preventive efforts rather than isolated, one-off activities.

Another essential principle is targeting and adequacy—the programme must clearly define its target group and select formats and content that correspond to the age, interests, and developmental characteristics of the young people involved. Effectiveness is further enhanced by linking different types of prevention and ensuring thematic continuity within risk-behaviour prevention, as the needs of the target group are complex and often overlapping. Early initiation is also crucial: prevention should begin in early childhood or the first years of schooling, when attitudes and habits can be shaped most effectively.

Preventive programmes should be positively oriented, promoting healthy lifestyles, strengthening competencies, and offering concrete healthy behavioural alternatives, thereby reducing the likelihood that young

people will turn to risky strategies. An integral component of effective prevention is also working with the KAB model (knowledge–attitudes–behaviour), which highlights not only the transmission of knowledge but also the shaping of attitudes and the resulting behavioural change as the ultimate goal of prevention.

A major added value lies in the peer element, active involvement, and interactivity, as peers often have greater influence on adolescents than adults, and participatory learning methods increase the effectiveness of preventive interventions. From the perspective of social norms, denormalisation is also important—setting expectations within the group and wider society so that risky behaviour is not perceived as common or acceptable. Another key principle is the support of protective factors, such as access to a caring environment, functional relationships, and information about professional help, all of which are essential sources of resilience. Finally, prevention should avoid ineffective strategies, particularly scare tactics or exclusively negative messaging, which have been shown to be counterproductive; instead, it should rely on evidence-based, realistic, and positively oriented approaches (Martanová, 2012).

### ***3.2 Theatre Performance***

The preventive use of short scenes, role-plays, and brief dramatic demonstrations is a common component of many prevention programmes. These methods rely on experiential learning, which cannot occur without the active involvement of the individual. In group-based work, they draw on social-psychological theories of interpersonal influence—such as social cognitive theory. According to Bandura, behaviour develops through the reciprocal interaction of personal, behavioural, and environmental factors; model scenes and vicarious learning can shape expectations, behavioural regulation, and self-efficacy (Bandura, 2001). Self-efficacy itself is a highly significant concept, playing a crucial role in whether individuals are able to manage challenging situations. Theatre has also been shown to influence empathy, communication, and social inclusion among adolescents (D'Andrea & D'Ulizia, 2025).

Summaries of drama-based therapies report medium-sized effects on psychological and behavioural outcomes, although these findings come mainly from clinical contexts and are subject to methodological limitations; nonetheless, they indicate the potential of drama as a mental-health tool. Systematic reviews of theatre-based interventions further document reductions in symptoms of anxiety, depression, and PTSD in adult samples, as well as indications of decreased suicidal risk among adolescents—again with caution regarding heterogeneity and risk of bias (Orkibi et al., 2023; Bayliss et al., 2025). However, these sources conceptualise theatre as an actively performed activity—i.e., as the act of

playing theatre. Analyses examining whether simply watching a theatrical performance can be considered a preventive activity are essentially missing. If we approached the viewing of a theatre performance in the same way as attending a lecture or any other passive, non-interactive format, its impact on the audience would very likely be minimal (Martanová, 2012).

Among young people, anti-stigma programmes show small but short-term effects on knowledge, attitudes, behaviour, and intentions to seek help. Interventions combining education and contact/first-person narratives tend to be more effective than isolated approaches (Jorm, 2020). It is also important to bear in mind that “contact” alone, without high-quality facilitation, typically results in effects that diminish quickly (Crockett et al., 2024; Song et al., 2023a).

#### **4. PREVENTIVE PROGRAMME: THE PERFORMANCE AND EXPERT DISCUSSION**

##### ***4.1 Structure and Themes***

The programme consists of a one-act theatrical performance (approximately 60–75 minutes) featuring six authentic stories, all of which are also known from the media, followed by a moderated expert discussion (45–60 minutes) led by psychologists or by a psychologist together with a coach/mentor.

The performance presents six stories, each told by one of the actors. The production is enriched with additional elements such as video clips, musical components, and a concluding authentic message from the artist whose music is used in the performance. The themes presented correspond to issues commonly encountered by children and adolescents, predominantly relating to mental-health difficulties—sometimes arising from highly unsuitable or entirely absent home environments.

The themes addressed during the discussion are shaped by the current interests of the audience; they may respond to a specific experience viewers have just had or address any additional questions related to mental health and adjacent topics. After the performance, viewers are informed that they can submit their questions or comments via a QR code projected on stage. At that point, the experts are already on stage and observe the incoming anonymous submissions (via Google Forms). They select appropriate questions that can be discussed with the whole group. If a participant wishes to ensure their question is answered, they may include their email address so that a response can be provided afterwards. The discussions are delivered by experts from Endlessly s.r.o., a psychological organisation focused on supporting the mental health of children and adolescents. This organisation and its services (including free chat-based

support for teenagers and online sessions for parents) are introduced at the beginning of the discussion.

This preventive format responds to several challenges characteristic of Generation Z (e.g., pressures to compare oneself, preference for online environments) and creates a safe space for emotional resonance and open dialogue. At the same time, it retains the possibility of direct communication and immediate expert reactions to emergent situations. The programme intentionally combines active forms of student engagement (discussion) with a passive, front-facing theatrical performance which, due to its themes and delivery, can nevertheless strongly affect students emotionally and experientially.

The expert discussion structures the emotional experience, enables emotional ventilation, translates it into concrete skills (e.g., how to approach the school psychologist), and connects students with local resources (school counselling services, helplines). Evidence shows that interventions enhancing help-seeking attitudes and intentions among young people have small but significant short-term effects—highlighting the importance of immediate access to concrete channels of support and follow-up opportunities (Crockett et al., 2024).

The theatrical performance combined with the moderated discussion uses several well-documented psychological mechanisms that substantially enhance its preventive impact. A key factor is emotional engagement and identification with the characters, which enables students to process mental-health themes through modelling and vicarious learning. Social cognitive theory describes how observing others in emotionally meaningful situations supports the internalisation of messages and subsequent changes in attitudes and behaviour (Bandura, 2001a; 2001b).

Another important benefit is normalisation and destigmatisation of mental-health difficulties, as the stories explicitly address topics that are often taboo in school environments, while the discussion allows experts to directly respond to students' questions. This combination of education and contact aligns with findings showing that anti-stigma interventions, although small in effect, have meaningful short-term impacts on attitudes and willingness to seek help among young people (Crockett et al., 2024; Song et al., 2023b).

Finally, the theatrical format supports the development of self-efficacy and social-communication skills, as students gain concrete coping strategies, hear examples of effective communication, and have opportunities to share their own experiences in a safe environment. Research on drama- and theatre-based interventions confirms that participatory theatrical activities can strengthen adolescents' self-efficacy and subjective well-being (Oliver et al., 2025).

## 5. RESEARCH

The research questions focus on whether this form of prevention is sufficiently activating to meet the expectation that students should be active participants within a preventive programme, as active engagement is associated with greater programme effectiveness and a stronger impact on students. We therefore examine how many students make use of the opportunity for active involvement and what themes their questions address.

### 5.1 Research Questions

- How many students were activated through this format to the extent that they submitted a question or comment via the QR code?
- How many students were activated through this format to the extent that they submitted a *relevant* question or comment via the QR code concerning mental health or a related psychological topic?

### 5.2 Research Design

The theatrical performances took place in various Czech towns (see table below). They were always held outside school buildings, most often directly in theatres or cultural centres. Each performance was attended by several classes (from different age groups), ranging from the eighth grade of lower-secondary school to the third year of upper-secondary school.

The performances and subsequent expert discussions were conducted between October 2025 and February 2026 and continue to be held beyond this period.

### 5.3 Research Sample and Overview of Responses

The table below lists the number of participants present at each theatrical performance. Age and gender of the audience were not distinguished. The sample consisted of students aged 14 to 18. The following columns in the table show the total number of responses submitted via the QR codes; these included both questions and comments, which varied in quality, length, and seriousness. The final column shows the number of so-called *adequate* questions — that is, questions or comments related to mental health or a closely connected psychological topic.

**Table 1: Overview of Performances and Responses**

	Number of participants	Number of responses	Number of adequate responses
Louny	248	51	19
Mělník	779	87	31
Jablonec	430	212	174

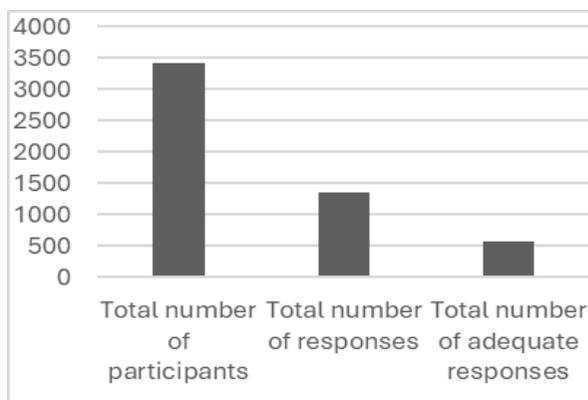
<b>nad Nisou</b>			
<b>Znojmo</b>	479	310	75
<b>Jablonec nad Nisou</b>	247	82	68
<b>Jablonec nad Nisou</b>	234	36	30
<b>Světlá nad Sázavou</b>	221	84	75
<b>Praha</b>	328	147	29
<b>Praha</b>	229	189	23
<b>Znojmo</b>	250	153	32

**Note:** followed by two performances and two discussions held consecutively

Source: Authors's calculations

The total number of responses was calculated as the sum of all submissions received via the QR codes. Questions and comments could be submitted after the performance and during the discussion. Any questions or responses sent afterwards were not taken into account.

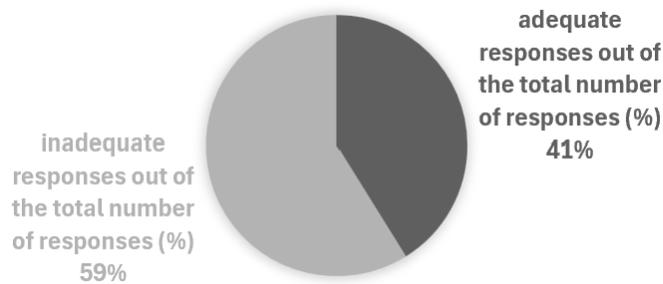
**Figure 1: Overview of the number of responses (total responses and number of adequate responses) in comparison with the total number of participants**



Source: Authors's calculations

Based on all responses submitted by participants, a thematic analysis was conducted. Questions and comments that were in no way related to mental health or other psychological topics were excluded. This categorisation was performed by analysing the content of each individual entry. The excluded questions and comments primarily concerned unrelated matters (e.g., remarks about what was happening in the audience, exclamations, emojis), queries directed at the experts leading the discussion (personal questions unrelated to the topic, sexual or other inappropriate remarks and comments), and questions aimed at the actors themselves (including personal inquiries).

**Figure 2: Percentage representation of adequate and inadequate responses**



Source: Authors's calculations

## **6. BENEFITS AND LIMITATIONS OF THE CHOSEN FORM OF MENTAL HEALTH PREVENTION**

### ***6.1 Benefits***

Among the clear benefits of using this theatre performance as a preventive activity, we can highlight the relevance and realism of the stories presented. They are authentic, truthful, and verifiable. The performance does not aim to frighten or, conversely, downplay the situation of the individuals involved. Higher audience engagement is supported by the discussion that follows the performance. Overall, the project also focuses on destigmatizing mental health issues and improving students' knowledge and attitudes.

The themes presented in the theatre performance can strongly resonate with the audience and may evoke both positive and intensely negative emotions. These emotions can be addressed during the subsequent discussion, where pupils and students receive information about where they can seek help if they experience psychological difficulties. They can also immediately pose specific questions on their own.

### ***6.2 Limitations and Risks***

A clear limitation is the frontal nature of the theatre performance itself; it does not allow for elements of participatory theatre-based prevention, in which participants actively take part in the acting. It also cannot be guaranteed that schools will continue working with the topic of mental health beyond the performance. Even the discussion that follows cannot ensure that all emotions will be addressed or all questions answered, nor can the quality of any subsequent school-based activities be guaranteed.

Therefore, it is very likely a one-time intervention, which reduces its effectiveness. Mental health is a highly sensitive topic. The cases presented may be very difficult for pupils and students who are personally affected by similar experiences. On the other hand, if students have never

encountered such situations (e.g., they come from very different social backgrounds), there is a risk that the themes will not resonate with them at all because they feel too distant. In that case, the program may be targeting an unsuitable audience.

## **7. PROPOSAL FOR IMPLEMENTATION IN THE SCHOOL ENVIRONMENT**

A theatre performance addressing demanding topics related to mental health needs to be thoroughly processed with pupils and students. Just as follow-up work after the performance is important, it is also recommended to work with pupils and students *before* they watch the performance. Some recommendations and proposals for effective implementation are described below.

### ***7.1 Before Viewing the Theatre Performance***

A suitable first step before seeing the theatre performance would be to open the topic of mental health and map pupils' and students' experiences with it. This can be done in many ways. One option is, for example, administering a short anonymous questionnaire to identify current needs and experiences. A meeting of teachers would also be appropriate, allowing them to agree on how they can incorporate the topic of mental-health prevention into their subjects.

If any pupil or student is significantly affected by a specific topic that is expected to appear in the performance, an individual consultation can be arranged to determine whether they wish to attend the performance, and so on.

The class teacher should be able to describe the situation in their class and inform the organizers in advance if pupils or students are currently dealing with some of the topics addressed in the performance. If so, the subsequent discussion can be more focused on that particular area. Teachers should also agree on who will work with the pupils afterwards and how they will address the emotions and information that may arise after the performance and discussion. This should be handled only by a teacher with the appropriate additional training (i.e., a prevention specialist or guidance counselor), unless the school has access to a school psychologist.

### ***7.2 Realization***

The implementation itself consists of watching the theatre performance and then actively participating in the discussion. During the discussion, it is possible to send questions via a QR code, which anonymously displays the question directly to the experts leading the session. They then select which topics can be covered during the discussion (choosing suitable themes, creating continuity, merging thematically similar questions, etc.).

During the discussion, pupils and students are also informed about the support options available if they experience mental-health difficulties. These range from immediate sources of help (family, specific school staff) to more distant ones (telephone helplines, online counseling services, chat counseling, crisis centers).

### **7.3 Reflection and Follow-Up Activities**

Follow-up programming after the performance is again the responsibility of the school. Just as the current situation of pupils and students is assessed before the performance, it is advisable to conduct a debriefing afterward (reflection, sharing), where more active engagement from everyone can be encouraged due to the significantly smaller group within the class. Pupils may be asked about their emotions, the specific stories that resonated with them and why. This can also include personal experiences that someone wishes to share related to the topic.

It is also appropriate to focus on activities that promote active involvement of pupils and students, such as practicing specific communication techniques, relaxation exercises, requests for help, and responding to challenging situations. Work on class and school climate can be integrated into programming for the entire school year. This may include elements that help improve climate and positively influence pupils' and students' well-being (e.g., class rituals, joint activities, establishing a class goal).

The first follow-up elements related to the topic of mental health should be introduced no later than 2–3 weeks after the performance, so that it is still possible to actively work with the experience and memory.

## **8. DISCUSSION**

Prevention of mental health difficulties is a key activity that many schools aim to focus on. However, there are relatively few tools that make it possible to open up a broader range of related topics. Effective prevention should offer a program that is long-term, comprehensive, systematic, targeted, adequate, and that integrates different types of prevention. It should also be appropriately tailored to the target group and begin early. This means, in the case of primary prevention of risk behaviour, before such behaviour appears within the target group (Martanová, 2012).

The theatre production *Doomed Generation Z* represents an interesting way to connect cultural experience with prevention. The post-performance discussions aimed to fulfil the need for interactivity, which traditional theatre would otherwise lack. Thanks to the direct interaction of experts with the audience and the opportunity to respond to their questions and comments (submitted via QR code), it was possible to at least partially meet this requirement.

However, it is important to note that this format motivated only a very small proportion of participants to engage. Only 16% of pupils or students

submitted a relevant question or comment. It is therefore evident that this form of prevention does not lead to substantial activation of the audience. Other potential effects on pupils and students were not examined.

The theatre production therefore partially meets the key requirements for interactivity, authenticity, and safe dialogue, which are essential when working with Gen Z—a group often sensitive to didactic moralism and a low level of participation. The experiential format activates emotional learning and socio-cognitive mechanisms (modelling, self-efficacy) associated with motivation for change and help-seeking. At the same time, we must respect the limits of existing evidence: anti-stigma effects among young people tend to be small and short-term. For this reason, follow-up steps are necessary (teachers' and other school professionals' work with the topic, integration into other school activities, availability of services, student reflection, etc.). Promising results of dramatic interventions on psychological symptoms come mainly from clinical adult samples; in universal school prevention, more methodologically rigorous studies are needed (Orkibi et al., 2023; Bysliss et al., 2025; Song et al., 2023).

Specific approaches are recommended for working with Generation Z students to improve the effectiveness of their learning (McCrindle, 2018). These principles are also fulfilled by this theatre-based prevention program. The first is *realness*—providing students with accurate and trustworthy information. The next is *relevance*, especially of the topic and the format. Appropriate visual and contextual framing is advised. Emphasis should also be placed on *responsiveness* to students' needs, which here may include, for example, choosing a format for asking questions that prioritises technology over speaking openly in front of the whole audience. The final recommendation is *relationality*, which is only partially present here because the experts are not in an ongoing relationship with the students (unlike teachers, who should work with the program content before and after the performance). The quality of the discussion atmosphere is already within the competence of the experts and would fall under this area as well (McCrindle, 2018).

## 9. CONCLUSION

The results of the study indicate that while the theatre performance supplemented with an expert-led discussion offers potential for emotional engagement and the opening of sensitive topics, its activating effect on students is limited. Only 16% of participants submitted a relevant question or comment, suggesting that the combination of a cultural experience and a follow-up discussion does not, by itself, lead to substantial participation among most adolescents. Although the theatrical format can appeal to emotions, foster identification with the stories, and support basic awareness of available help, it does not replace long-term, structured, and systematically delivered prevention.

The study confirms that when working with Generation Z, it is essential to consider a comprehensive prevention system that connects the experiential component with subsequent work by teachers, school counselling professionals, and other key actors. A theatre-based program can serve as an effective initial impulse if it is embedded within a broader framework of activities that allow students to process emotions safely, develop concrete competencies, and actively experiment with communication and coping strategies.

The findings also open space for further research—particularly for a deeper analysis of the short-term and long-term impacts of theatre-based preventive interventions on adolescents' attitudes, knowledge, and behaviour. Future studies should also focus on students' qualitative experiences, the role of the school environment in follow-up work, and the identification of factors that may further strengthen participation. Mental health prevention can thus benefit from combining innovative approaches with traditional pedagogical and counselling methods, provided they are interconnected and respect the specific needs of the young generation.

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## **FUTURE-PROOFING EDUCATION: INSIGHTS FROM GENERATION Z's EXPECTATIONS AND REGIONAL CAPACITIES**

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**Abstract:** *This article analyzes the educational needs and expectations of Generation Z members in the university environment in the Czech Republic and Slovakia. The research focuses on students' preferences regarding teaching formats and their experiences with digital tools in education. Attention is also paid to students' attitudes towards interactive methods, online activities, and gamification elements. The analysis was conducted through a questionnaire survey, in which 441 respondents out of a total of 1,275 students approached participated (a response rate of 34.6%). The results show that students prefer interactive teaching methods, the use of modern technologies and digital platforms, improved teacher presentation skills, and an individual approach. Based on the data obtained, recommendations for pedagogical design in applied logistics are formulated, reflecting both the labor market's requirements for graduate competencies and the realistic possibilities for their implementation in the region, to increase graduates' employability.*

**Key words:** *Education, Generation Z, Competence, University*

**JEL Classification:** *I230, I250, M540*

### **1. INTRODUCTION**

The world today is characterized by unprecedented dynamism, shaped by rapidly changing technologies, a globalized economy, and a growing reliance on complex, often fragile supply chains. These factors also increase society's exposure to a wide range of security threats, from industrial accidents to extreme weather events. In such a volatile environment, logistics systems are of paramount importance, as they serve as the basic infrastructure that ensures the continuity of economic and social processes. However, the key factor in these systems' ability to respond to the growing level of uncertainty is not only technology and infrastructure, but above all, the human capital that designs, manages, and

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develops them. Generation Z consists of individuals born between 1997 and 2012 (Dimock, 2019). Generation Z entering the labor market brings new educational requirements that differ from those of previous generations, particularly in their expectations for the use of digital technologies, teaching methods, and forms of knowledge acquisition. Traditional educational approaches are thus no longer fully responsive to the needs of today's students and the dynamically changing requirements of the labor market. Generation Z is characterized by its digital fluency, having grown up in an environment where technology was an integral part of their lives. This influences their learning preferences, with a strong inclination toward interactive, technologically enhanced learning environments (Piglionic and Presti, 2025). With the advent of Industry 4.0 and 5.0 concepts focused on digitization, automation, and data processing, there has been a fundamental shift in the competencies required of future workers, particularly in digital and analytical skills.

This article focuses on university students in the Czech Republic and Slovakia to identify their expectations regarding educational methods and the required teaching approaches. The results indicate that students prefer, in particular, the development of digital knowledge and the systematic deepening of digital competencies, which align with current labor market requirements and new industrial concepts. The research aims to link students' expectations with employers' needs and to integrate the findings into teaching so that graduates are competitive, employable, and prepared for future professional challenges. In the context of a long-term shortage of skilled workers, referred to as a capacity crisis, the modernization of higher education is an important tool for strengthening regional human capacity.

## **2. THEORETICAL BACKGROUND**

Current higher education is significantly influenced by the arrival of Generation Z, which brings new ways of learning, expectations, and requirements for teaching methods to the educational process. Generation Z grew up in a digital environment, reflected in their relationships with information, communication, and education. Chardonnens (2025) points out that students of this generation prefer visually stimulating, interactive, and technology-supported educational methods that allow for active participation and immediate feedback. The traditional transmissive model of teaching, based primarily on the transfer of information, is therefore increasingly seen as insufficient to maintain their attention and motivation.

With the development of digital technologies, the educational environment is undergoing a transformation that requires innovative approaches to education. Zawacki-Richter et al. (2019) point to the growing importance of artificial intelligence in higher education, with intelligent teaching systems, learning process analysis tools, and conversational agents among

the most commonly used technologies. However, the authors also point out that the successful implementation of these technologies cannot be based solely on technical solutions, but requires teachers to play an active role in their pedagogical use. The research emphasizes the need for close cooperation between technologies and the human factor, particularly in developing students' social and emotional competencies.

The need to modernize the education system is closely linked to changes in the labor market, driven by globalization, technological acceleration, and growing uncertainty. As Ghiani et al. (2013) note, logistics systems can no longer be understood solely as the organization of material and information flows, but as a complex interconnection of infrastructure, technical resources, and human resources. Jurová et al. (2016) point out that the dynamics of the current environment and the limited predictability of future developments increase the demands on the adaptability of logistics and security structures. Al-Ababneh et al. (2021) also emphasize that the quality and resilience of logistics systems directly impact the competitiveness of states and organizations. These facts reinforce the need for experts who not only have technical knowledge but also the ability to manage complex and risk-laden systems.

In the context of Industry 4.0 and 5.0, the requirements for logistics workers' competencies are also changing significantly. Koh and Yuen (2022) state that virtual communication skills, interdisciplinary collaboration, adaptability in a digital environment, and working with modern technologies are becoming key. Sapper et al. (2021) emphasize the importance of IT competencies in robotics, big data, artificial intelligence, and digital communication systems, complemented by analytical and statistical skills. Bogoviz et al. (2019) identify three basic professional competencies in the context of Industry 4.0: the ability to generate innovation, programming knowledge, and digital thinking. The development of digital competencies is not limited to IT specialists, but should concern the entire organization (Blanka et al., 2022). Treviño-Elizondo and García-Reyes (2023) confirm that the advent of Industry 4.0 is driving a growing demand for skilled workers with high levels of digital skills.

The above findings show that higher education must respond to both the specific characteristics of Generation Z and the changing demands of the labor market, particularly in logistics. The combination of modern teaching methods, digital technologies, and the development of professional competencies is a key prerequisite for preparing graduates who are capable of working in Industry 4.0 and 5.0 environments.

### **3. PROBLEM FORMULATION AND METHODOLOGY**

The research sample consisted of students from Tomas Bata University in Zlín (Faculty of Logistics and Crisis Management, Faculty of Management and Economics) and Alexander Dubček University in Trenčín (Faculty of Social and Economic Relations). Data collection was carried out via an online questionnaire on the Survio platform, distributed by academics involved in the INTERREG V-A SK–CZ project to selected study programs. Data collection took place between October 19, 2025, and November 21, 2025. A total of 1,275 students were approached, of whom 441 completed the questionnaire (a response rate of 34.6%). In terms of sample structure, women predominated (68.3%), with men accounting for 31.7% of respondents. The most represented were bachelor's (53.1%) and master's (46.3%) students, while doctoral students were minimally represented (0.7%). Most respondents came from the Czech Republic (72.1%), with the rest from Slovakia (27.9%). Respondents were evenly distributed across individual years of study. Given that the largest group of respondents were students of the Faculty of Logistics and Crisis Management at Tomas Bata University in Zlín, the article's further analysis focused primarily on evaluating the competencies of future logistics professionals. The bachelor's degree program in Applied Logistics at the Faculty of Logistics and Crisis Management at TBU in Zlín was created in response to practical requirements. It is a professional program that prepares future experts for the private and public sectors.

#### **4. RESULTS**

The Results chapter presents the results of the questionnaire survey—one section focused on students' experiences with different teaching approaches and their preferences. The results show that the vast majority of respondents have experience with online teaching (414 students; 93.9%), while only 27 respondents (6.1%) do not.

The preference item allowed respondents to rank individual teaching methods according to their popularity (1 = most preferred, 3 = least preferred). The highest preference was for online teaching with the possibility of interaction, with an average value of 1.7. In second place was face-to-face teaching in a lecture hall with an average value of 2.1. The lowest preference was given to a hybrid form combining face-to-face and online teaching (average = 2.2).

The results suggest that students prefer the flexibility and interactive nature of online teaching, while maintaining a positive attitude towards traditional face-to-face education. The hybrid model is perceived less favorably, which may be related to the greater demands on organizational coordination across both forms or to lower levels of student engagement.

Another part of the survey focused on the use of digital tools in teaching and their perceived benefits. The most frequently used tool is IS Moodle as a repository for study materials (355; 80.5%). Students also reported experience with interactive quizzes and continuous testing (296; 67.1%) and with online discussions or group work in the Zoom/Teams environment (269; 61.0%). Simulations and online laboratory activities (65; 14.7%), gamification (85; 19.3%), and asynchronous instructional videos (158; 35.8%) are used less frequently.

In the following item, respondents evaluated which tools and methods they consider beneficial. Visual and multimedia elements (videos, infographics, simulations, gamification) received the highest support, with 327 respondents (74.1%) selecting them. Interactive methods, such as discussions and group work, are considered motivational by 212 students (48.1%), and active teacher involvement is preferred by 188 students (42.6%). Only 112 respondents (25.4%) considered traditional lectures to be practical.

Respondents also assessed what obstacles prevent them from fully utilizing digital tools in their studies. The most frequently mentioned problem was the low level of digital skills among teachers, which was cited by 207 students (46.9%). Another significant barrier is inadequate technology, especially the quality of the internet or computer equipment (183; 41.5%). Another limiting factor identified is inappropriate or outdated teaching materials, which were mentioned by 160 respondents (36.3%). For 108 students (24.5%), a lack of time is an obstacle, and 95 (21.5%) perceive the students' low digital literacy as a problem. The "Other" category was selected 24 times (5.4%) and included individual comments primarily about organizational and systemic shortcomings.

The results show that the key areas for improvement are, in particular, support for teachers in developing digital skills and better preparation of teaching materials so that digital teaching can be used more effectively and to its full potential.

One of the open-ended questions in the questionnaire asked respondents to identify specific digital tools and teaching approaches that most help them in the learning process. Students were asked to list one to three tools and briefly explain their reasons. The answers were detailed and provided valuable insight into students' practical experiences with digital technologies in education. Based on a qualitative analysis of the responses, the following thematic areas were identified:

- The importance of artificial intelligence as a study aid – respondents perceive AI-based tools as a key support in their studies, especially when explaining misunderstood material, practicing lessons, creating test questions, and searching for information.

- The role of Moodle and MS Teams as basic study infrastructure - students most often emphasized the benefits of regular access to study materials through these platforms, which they consider to be fundamental pillars of teaching organization.
- The benefits of interactive forms of learning – tools enabling interactive practice (e.g., Kahoot, Quizlet) were particularly positively evaluated, as they increase motivation and support memorization of the curriculum, according to respondents.
- The importance of short instructional videos and recordings – students prefer concise and understandable explanations of the subject matter, considering the video format to be particularly effective.
- Priority of quality content over technology itself - although technical equipment (tablets, laptops) is perceived as important, respondents repeatedly emphasized that the quality and comprehensibility of teaching materials play a decisive role.

In an open-ended section of the questionnaire, respondents had the opportunity to offer suggestions for innovation and improvement in educators' teaching. Based on a qualitative analysis of the responses, the following key recommendations were identified:

- Strengthening interactive teaching methods – respondents recommend more frequent use of short quizzes and ongoing testing (e.g., Kahoot, Quizizz, Quizlet), the use of practical tasks and simulations of real-life situations, as well as group work and team projects. Discussions, brainstorming, and short tasks integrated directly into teaching are also considered beneficial.
- Use of gamification as a motivational tool - students suggest using game elements to increase engagement in teaching, including competitions between individuals or groups and symbolic forms of reward (e.g., bonus points). Emphasis is also placed on providing positive feedback and creating a supportive environment that allows for learning from mistakes.
- Development of digitization and use of modern technologies - respondents consider it appropriate to make study materials available in advance through educational platforms (e.g., Moodle) and to expand teaching with multimedia and interactive elements, including instructional videos, digital worksheets, and artificial intelligence-based tools. The possibility of online participation and the availability of lecture recordings are also perceived as beneficial.

- Improving pedagogical communication and personal approach – students emphasize the importance of clear and dynamic presentation, the use of practical examples, and teachers' personal experiences. A partnership approach to students and the use of humor to increase attention and engagement are viewed positively.
- Organizational and didactic measures - respondents recommend systematically structuring teaching materials, regularly including repetition of the subject matter, and short verification tests at the end of teaching blocks. For longer teaching units, it is advisable to include breaks. At the same time, they point out the need to limit overly theoretical and abstract explanations that lack practical applications.

## **5. DISCUSSION**

The results of a questionnaire survey among students provided a comprehensive overview of preferred teaching methods and digital tools that support their learning and motivation. This is confirmed by a study by Chan and Lee (2023), which states that these young people prefer interactive platforms and online educational tools and seek personalized, real-time learning opportunities that are lacking in conventional methods. According to Gupta et al. (2024), Generation Z shows a strong interest in AI, especially for its educational and professional applications. At the same time, a survey of business practices was conducted to identify the key hard and soft skills of logistics workers, thereby empirically capturing the labor market's requirements for graduates in logistics. The combination of both perspectives—student and employer—makes it possible to formulate specific recommendations for modifying study programs to increase their application relevance.

The authoring team aims to systematically implement these findings into teaching so that graduates are as well prepared as possible for professional practice. The Faculty of Logistics and Crisis Management not only strives to impart theoretical knowledge but also emphasizes the development of practical skills and the ability to apply knowledge in real-life situations. This is reflected in the faculty's material and technical facilities, particularly the Logistics Laboratory, which is equipped with tools commonly used in the corporate and public sectors. Students work with specialized software such as Witness for modeling, simulation, and optimization of logistics processes, and PTV VISION for transport planning and logistics in cities and municipalities. The laboratory's equipment also includes a modern CAD system supporting design automation, including modules for building statics and energy efficiency in production. Students in the follow-up master's program also use tools to map and optimize processes in companies. The development of hard skills

is complemented by targeted activities focused on soft skills, particularly through the involvement of field experts in teaching. A series of lectures and workshops led by HR specialists helps students develop communication, teamwork, leadership, and other key soft skills required by employers. This comprehensive approach supports the integration of academic education with labor-market needs and contributes to increasing graduates' competitiveness.

## 6. CONCLUSION

This article focused on identifying the expectations of university students in the Czech Republic and Slovakia regarding teaching methods and educational approaches, and their connection to employers' requirements for the competencies of future graduates. The results confirm that students place particular emphasis on the development of digital knowledge and the systematic deepening of digital competencies, which align with current labor market trends and Industry 4.0 and 5.0 concepts. At the same time, there is a need to strengthen the practical orientation of teaching and the ability to apply theoretical knowledge in real-life situations.

Based on the findings, we can recommend wider implementation of digital and interactive educational tools, including multimedia study aids, interactive models and simulations of systems and their structures, case studies, and interactive e-learning modules with practical tasks. One of the most effective forms of teaching in the field of logistics and safety is the use of virtual reality (VR), which enables the visualization and simulation of logistics flows, the modeling of logistics processes in specific environments, and the training in accident and crisis response. The use of predictive tools based on artificial intelligence to forecast the development of logistics processes and flows, or to simulate crisis scenarios in laboratory conditions, also represents significant potential.

Linking students' expectations to employers' requirements and systematically integrating them into teaching is a key prerequisite for increasing graduates' competitiveness and employability in the labor market. In the context of a long-term shortage of skilled workers, known as a capacity crisis, the modernization of higher education in logistics and security is an important tool for strengthening regional human capacity and sustainable labor-market development.

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## GENERATION Z'S FUTURE WORK PREFERENCES: FLEXIBILITY, PURPOSE, AND TECHNOLOGY ORIENTATION

*Katarina HRUDKOVA*<sup>1</sup>

**Abstract:** *The entry of Generation Z into the labour market coincides with rapid changes in work organisation, digitalisation, and shifting expectations toward employers. This article examines whether key work values and preferences of Gen Z can be structured into a coherent model relevant for human resource management, focusing on three latent domains, purpose orientation, technology orientation, and preference for work flexibility. The study draws on a quantitative survey of 190 Slovak high-school students aged approximately 15 to 19 years, using five-point Likert-scale items. The measurement structure and the relationships among constructs were tested using confirmatory factor analysis and structural equation modelling with a WLSMV/DWLS estimator appropriate for ordinal data. The model showed acceptable fit, with CFI = 0.971, TLI = 0.952, RMSEA = 0.051, SRMR = 0.061, and robust CFI = 0.951, robust RMSEA = 0.053. The structural results indicate that technology orientation significantly increases preference for flexibility, while the direct effect of purpose orientation on flexibility was not supported, and purpose and technology orientations were positively associated. The findings underline technology-related attitudes as an important driver of flexibility expectations among Gen Z and provide implications for employer branding, job design, and early talent attraction and retention.*

**Key words:** *human resource management, workforce flexibility, Generation Z, career preferences, technology orientation*

**JEL Classification:** *M12, M54, J24*

### 1. INTRODUCTION

The entry of Generation Z into the labour market coincides with major changes in work organisation, digital demands, and employer expectations, shifting the “future of work” debate toward how young people’s values and preferences cluster into coherent patterns that can inform HR practice (Moffett et al., 2023). Career outcomes may also depend on broader socio-economic conditions shaping work readiness and perceived opportunities (Mavhungu et al., 2024). Prior research shows that Gen Z expectations regarding motivation, satisfaction, and work values vary across sectors and contexts, and unmet expectations can increase

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early exits and turnover risk (Seyfi et al., 2024; Gao et al., 2025; Wu et al., 2025).

Work flexibility is a central theme, with younger cohorts increasingly emphasising hybrid arrangements and autonomy, while flexibility also relates to the social and psychological experience of work settings (Pauli & Dudek, 2025; Chmiel, 2025). Another consistent line concerns technology orientation, where digital readiness, an "AI mindset," and learning-related capabilities are linked to career readiness, and creativity and engagement support adaptation in hybrid contexts (Mavhungu et al., 2024; Imjai et al., 2025; Katsaros, 2025). At the same time, Gen Z often stresses meaningful work, value congruence, and identity, with employer brand identification shaping job pursuit intentions, gender differences suggesting heterogeneity in expectations, and personalised employee experience influencing perceived fit (Kontos et al., 2025; Lassleben & Hofmann, 2023; Thomas et al., 2025). Retention-relevant processes further involve how expectations and mindset relate to turnover intentions, especially in demanding sectors (Botezat et al., 2023; Wu et al., 2025). Finally, evidence on career success highlights multidimensional determinants, including contextual factors and gendered interpretations of obstacles and success, while project-based settings may shape early-career sustainability needs (Mavhungu et al., 2024; Fischer & Luiz, 2024; Borg et al., 2023).

Building on these insights, we apply a single SEM framework to validate measurement and test relationships among latent constructs. We conceptualise PURPOSE as meaningful work and positive impact, TECH as technology and future-of-work orientation, and FLEX as preference for work flexibility, primarily time autonomy and related location preferences (REMOTE). We test whether PURPOSE and TECH are positively associated with FLEX and whether PURPOSE is positively associated with TECH (PURPOSE ↔ TECH), indicating coherence between value-driven and technology-oriented attitudes. In the measurement model, creativity is specified as an indicator of TECH to capture the broader character of technology-related work attitudes (Katsaros, 2025; Imjai et al., 2025).

## **2. PROBLEM FORMULATION AND METHODOLOGY**

In this study, we examined how young people's work preferences and value orientations within Generation Z are interrelated and whether these attitudes can be used to build a coherent model of relationships applicable to HR practice. We assumed that three attitudinal domains are interconnected in this cohort: meaningful work and orientation toward positive impact (*purpose\_lat*), a positive attitude toward modern technologies and the future of work shaped by technology (*tech\_lat*), and a

preference for time flexibility and autonomy in work organisation (flex\_lat). Therefore, the research problem was not formulated only descriptively, but as a test of whether these attitudes can be reliably captured through latent variables and whether statistically supported relationships exist between them.

The analytical procedure was divided into two consecutive steps. First, we validated the measurement part of the model using confirmatory factor analysis (CFA) in order to assess whether the selected questionnaire items adequately represent the intended latent constructs. Subsequently, we applied structural equation modelling (SEM), which enables testing relationships among latent variables within a single integrated specification.

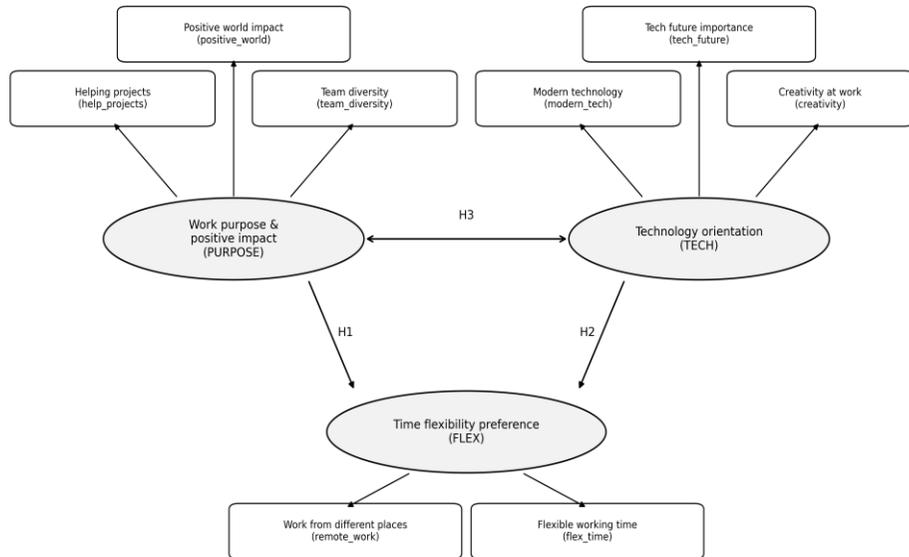
In the measurement model, the construct of meaningful work and positive impact (purpose\_lat) was operationalised using items focusing on helping projects/people or the planet, perceiving work as having a positive contribution, and preferring team diversity (help\_projects, positive\_world, team\_diversity). The construct of technology orientation (tech\_lat) was defined through a preference for work using modern technologies, a belief that the importance of technology will increase in the future, and a preference for creativity at work (modern\_tech, tech\_future, creativity). The construct of flexibility preference (flex\_lat) was measured in the final specification by two indicators capturing a preference for working from different locations and a preference for flexible working hours (remote\_work, flex\_time). The item addressing working in an office with fixed working hours was also considered in a reverse-coded form in earlier checks; however, it was not included in the final measurement model because its link to latent flexibility was weak and the model was more stable without it.

For the structural part, we formulated three hypotheses corresponding directly to the final SEM specification: H1 assumed a positive effect of meaningful work and positive impact (purpose\_lat) on flexibility preference (flex\_lat); H2 assumed a positive effect of technology orientation (tech\_lat) on flexibility preference (flex\_lat); and H3 assumed a positive association between meaningful work and positive impact (purpose\_lat) and technology orientation (tech\_lat). Parameter significance was evaluated at  $p < 0.05$ . Because the items were measured on a five-point Likert scale, estimation used the WLSMV approach (reported as DWLS in lavaan), which is appropriate for ordinal variables. Model adequacy was assessed using fit indices (CFI, TLI, RMSEA, SRMR), which indicate the degree of alignment between the proposed structure and the observed data.

The data were collected via a questionnaire survey among secondary school students belonging to Generation Z; respondents were

approximately 15 to 19 years old. Participation was anonymous and voluntary. Respondents rated statements on a five-point Likert scale from "strongly disagree" to "strongly agree." The analysis included 190 valid responses.

**Figure 1:SEM model diagram**



Source: Authors' own processing

### 3. RESULTS

In this section, we present the analysis outputs in a way that enables an objective and reliable interpretation of the relationships among the examined variables. We assumed that before assessing the associations between constructs, it is necessary to verify whether the selected measurement model fits the data and whether the indicators adequately represent the intended latent variables. For this reason, we first conducted a confirmatory factor analysis (CFA) as a fundamental step in validating the measurement model.

To evaluate the adequacy of the measurement model, we used a set of standard model fit indices that collectively capture the degree of agreement between the empirical data and the model specification. An overview of the key fit indices is provided in Table 1, which serves as the basis for the subsequent interpretation of results.

**Table 1: Fit indices of the confirmatory factor analysis (CFA) model**

Measure	Standard	Scaled/Robust
Estimator	DWLS (WLSMV)	
N (observations)	190	
Chi-square	25.489	30.201
df	17	17
p-value (scaled)	0.025	
CFI	0.971	0.951
TLI	0.952	0.92
RMSEA	0.051	0.053
SRMR	0.061	0.061
Chi-square (standard)	25.489	
df (standard)	17	
Chi-square (scaled)	30.201	
df (scaled)	17	

Source: Authors' own processing in R (lavaan package), based on the survey data

In table, we report the results of the measurement model fit assessment (CFA) for the Generation Z sample (N = 190), estimated using DWLS (WLSMV), which is appropriate for ordinal Likert-scale items. The chi-square test reached 25.489 with 17 degrees of freedom, while the scaled version was 30.201 (df = 17) and statistically significant (p = 0.025). As the chi-square statistic in CFA is sensitive even to minor discrepancies, model adequacy was evaluated primarily using incremental and residual fit indices. The values of CFI = 0.971 (robust = 0.951) and TLI = 0.952 (robust = 0.920) indicate good to acceptable fit. RMSEA was 0.051 (robust = 0.053), suggesting a borderline but still acceptable level of approximate fit. The SRMR value of 0.061 further supports that the differences between the observed and model-implied relationships are relatively small. Overall, the fit indices confirm that the measurement model demonstrates acceptable to good fit and can be considered an appropriate basis for subsequent structural modeling of relationships among the latent constructs.

**Table 2: Factor Loadings of Indicators in the CFA Measurement Model**

Latent construct	Indicator	Unstd. loading	SE	z	p-value	Std.lv	Std.all
purpose_lat	help_projects	1	-	-	-	0.709	0.709
purpose_lat	positive_world	0.982	0.181	5.439	0	0.697	0.697
purpose_lat	team_diversity	0.775	0.115	6.767	0	0.55	0.55
tech_lat	modern_tech	1	-	-	-	0.865	0.865
tech_lat	tech_future	0.488	0.179	2.734	0.006	0.422	0.422
tech_lat	creativity	0.334	0.142	2.358	0.018	0.289	0.289
flex_lat	remote_work	1	-	-	-	0.648	0.648
flex_lat	flex_time	0.84	0.292	2.877	0.004	0.544	0.544

Source: Authors' own processing in R

In the measurement model, we used confirmatory factor analysis (CFA) to examine the extent to which the individual questionnaire items represent the latent constructs `purpose_lat`, `tech_lat`, and `flex_lat`. Table 2 presents the factor loadings in both unstandardized and standardized form, together with standard errors, z-values, and p-values for the estimated parameters. For each latent construct, one loading was fixed to 1 to ensure model identification and factor scaling; therefore, SE, z, and p-values are not reported for these fixed parameters. All estimated loadings were positive, and all freely estimated indicators were statistically significant ( $p < 0.05$ ), supporting the intended assignment of indicators to their respective constructs. In terms of standardized loadings (Std.all), the highest values were observed for `purpose_lat` (particularly `help_projects` and `positive_world`), while `flex_lat` was measured with moderate strength by `remote_work` and `flex_time`. Within `tech_lat`, `modern_tech` showed the strongest association, whereas `tech_future` and especially `creativity` exhibited weaker standardized loadings, indicating that these indicators contribute to explaining technology orientation to a lesser extent.

After validating the measurement model, we proceeded to estimate the structural part of the SEM, testing whether the latent constructs capturing purpose (`purpose_lat`) and technology orientation (`tech_lat`) explain preferences for time flexibility (`flex_lat`). The structural model was estimated using the same DWLS (WLSMV) approach appropriate for ordinal indicators. Overall model adequacy was evaluated using the same fit indices as in the CFA, and these values provide the basis for interpreting the magnitude and statistical significance of the structural relationships.

**Table 3: Hypothesis testing results in the SEM model**

Hypothesis	Relationship (arrow)	Unstd. estimate	SE	z	P-value	Std. effect (Std.all)	Result
H1	purpose_lat → flex_lat	0.100	0.095	1.05	0.294	0.110	Rejected
H2	tech_lat → flex_lat	0.305	0.133	2.30	0.021	0.407	Accepted
H3	purpose_lat ↔ tech_lat	0.145	0.062	2.338	0.019	0.236	Accepted

Source: Authors' own processing in R

**H1** (purpose\_lat → flex\_lat). Hypothesis H1 tested whether a stronger orientation toward meaningful work and positive societal impact (purpose\_lat) predicts a stronger preference for time-related work flexibility (flex\_lat). This relationship was specified as a direct structural path (regression) in the SEM. Although the estimated effect was positive, it was not statistically significant (unstandardized estimate = 0.100,  $z = 1.05$ ,  $p = 0.294$ , Std.all = 0.110). Substantively, this suggests that the tendency for purpose-related values to translate into stronger time-flexibility preferences was not supported in the analysed sample. Therefore, H1 was rejected.

**H2** (tech\_lat → flex\_lat). Hypothesis H2 examined whether a more positive orientation toward modern technologies and the technological future of work (tech\_lat) increases preferences for time flexibility (flex\_lat). The SEM results indicated a positive and statistically significant effect (unstandardized estimate = 0.305,  $z = 2.30$ ,  $p = 0.021$ , Std.all = 0.407). This finding implies that respondents with higher technology orientation are more likely to prefer flexible working-time arrangements, which is consistent with the interpretation that openness to technology is associated with stronger autonomy-related expectations in organising work. Accordingly, H2 was accepted.

**H3** (purpose\_lat ↔ tech\_lat). Hypothesis H3 assessed whether purpose orientation (purpose\_lat) is associated with technology orientation (tech\_lat). As this is a non-directional relationship, it was tested as a covariance between the latent constructs. The covariance was positive and statistically significant (cov = 0.145,  $z = 2.338$ ,  $p = 0.019$ , Std.all = 0.236), indicating that individuals who emphasise meaningful work and positive impact also tend to hold more favourable attitudes toward modern technologies and their role in the future of work. Thus, H3 was accepted.

Finally, the endogenous construct flex\_lat reached  $R^2 = 0.199$ , meaning that purpose\_lat and tech\_lat jointly explain approximately 19.9% of the variance in time-flexibility preferences. Technology orientation accounts for a substantive part of these differences, however, the remaining

unexplained variance indicates that additional determinants of flexibility preferences likely operate beyond the scope of the present model.

#### **4. CONCLUSION**

This study examined how Generation Z's work-related values and preferences cluster into latent constructs and how these constructs relate within a structural model. The results support a measurement structure comprising PURPOSE (meaningful work and positive impact), TECH (technology orientation and future-of-work attitudes), and FLEX (preference for flexibility operationalised mainly through remote-work preference and flexible time). The structural estimates indicate that technology orientation is a significant positive predictor of flexibility preferences, while the direct effect of purpose orientation on flexibility was not statistically supported. At the same time, PURPOSE and TECH were positively associated, suggesting that value-driven and technology-oriented attitudes can co-exist within the same profile of young respondents.

From a practical HR perspective, the findings imply that designing flexible work arrangements for Gen Z may be particularly effective when aligned with technology-enabled work environments and digital readiness. Employer communication and job design may therefore benefit from integrating flexibility with a clear technological value proposition, while purpose-related messaging may be more relevant for broader employer attractiveness than for explaining flexibility preferences alone. Given that the model explains a moderate share of variance in flexibility, future research should extend the framework by incorporating additional predictors, testing alternative indicators of flexibility.

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## CURRENT CHALLENGES IN MANAGING THE PERFORMANCE OF GENERATION Z EMPLOYEES IN INDUSTRIAL ENTERPRISERS

*Martin HUDCOVSKÝ<sup>1</sup>*  
*Miloš ČAMBÁL<sup>2</sup>*

**Abstract:** *Industrial enterprises are currently facing major changes. In industrial practice, we observe the transformation of jobs, as well as the implementation of the latest technologies to facilitate work. For employee performance management, the current fundamental challenge is the entry of Generation Z into the dynamically developing industrial sector. Generation Z employees, who have already been active on the labor market for the past few years, exhibit different behavior in the work environment compared to previous generations. This generation brings a different value setting to the industrial environment than the previous ones. Industrial enterprises will have to deal with the questions of how to motivate this generation of employees, what style to work with them and, last but not least, how to retain Generation Z employees. The article focuses on identifying challenges in the area of performance management with a focus on Generation Z and industrial enterprises.*

**Key words:** *Generation Z, performance management, industrial enterprises*

**JEL Classification:** *M12, M54, J24*

### 1. INTRODUCTION AND THEORETICAL BACKGROUND

The global industrial sector is currently undergoing a dual transformation. On the one hand, there is a technological revolution known as Smart Industry, which integrates cyber-physical systems, artificial intelligence and the Internet of Things into production processes (Bińczycki et al., 2023). On the other hand, there is a demographic shift in the workforce, with Generation Z, born after 1995, beginning to replace Generation X and later Generation Y. It is estimated that by 2030, Generation Z, together with Generation Y, will make up three-quarters of the global workforce (Deloitte, 2025).

Generation Z is the first generation of digital natives, which gives them an advantage in the Smart Industry environment. Their ability to quickly

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adopt new technologies and intuitively master digital interfaces is a great asset to industrial companies (Bińczycki et al., 2023). However, this digital prowess comes with high expectations for the quality of workplace technology. Generation Z employees see outdated systems as a barrier to their productivity and a source of frustration (Salvadorinho et al., 2024). (Zahra et al., 2025) in their review, they state that Generation Z is characterized by multitasking and a lower tolerance for routine and monotonous tasks that are still common in industry. This creates pressure on human resource management systems to rethink job roles towards greater variability and intellectual stimulation.

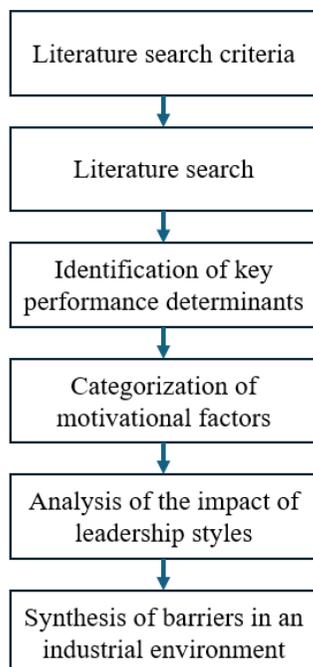
Performance management in industrial enterprises has historically been based on the principles of Taylorism. It involved a strict division of labor, process control, and quantitative standards. Generation Z, who grew up in a digital world, exhibits different behavioral patterns. For this Generation, work is no longer just a source of livelihood, but they seek a deeper meaning and ethical dimension in it. (Shinde and Surve, 2025). If an industrial enterprise does not offer an environment in line with their values, there is a decrease in engagement, which is reflected in an increasing trend of silent departure or high turnover. (Surugiu et al., 2025).

The aim of this article is to analyze how the specific characteristics of Generation Z affect their work performance in the demanding environment of industrial production and to propose management strategies that can combine strictly defined production processes and the need for flexibility of young employees.

## **2. METHODS**

Given the aim of the article, the method of comparative analysis and literary synthesis was chosen. The sample studied consisted of 15 professional publications and scientific studies from the period 2023-2025, which were selected based on their relevance to the issue of Generation Z performance management in the context of Smart Industry.

**Figure 1: Analytical procedure**



Source: (own elaboration, 2026)

The first step in Figure 1 serves to set relevant theoretical outputs for the given topic. The outputs were implemented based on keywords. The keywords were: employee performance management, Generation Z, industrial enterprise. The identification focuses on specific scientific articles, thereby increasing the quality and academic expertise of the information. The literature search was carried out in the academic databases Web of Science and Scopus, and was also supplemented by the Google Scholar search engine. The identification of key performance determinants was based on the latest news (Deloitte, 2025). Subsequently, a categorization of motivational factors was created for Generation Z according to the self-determination model in industry (Salvadorinho et al., 2024). The next step in the implementation was to create an analysis of the influence of people's leadership styles. This was carried out on the basis of correlation studies according to the authors (Lee and Lim, 2024; Kwartawaty et al., 2024). The final step was a synthesis of barriers in the industrial environment, which focused on the supply chain and automation (Stawiarska et al., 2025).

### 3. RESULTS

The findings were divided into four main points.

### ***3.1 People leadership as an important factor in performance and engagement***

Leadership style is often a critical point in industry. (Lee and Lim, 2024) examined the impact of people leadership during the post-pandemic period and found that transformational people leadership has the strongest correlation with engagement among Generation Z. Leaders who use inspirational motivation and an individual approach are able to manage performance more effectively than those who rely on a transactional model of rewards and punishments (Kwartawaty et al., 2024). According to (Widodo and Maghfuriyah, 2024) an organizational culture that supports transformational leadership directly impacts work-life balance, which is one of the most important factors for Generation Z employees when evaluating an employer. For the manufacturing sector, this means that the line manager must stop being just a "supervisor" and become a "coach." (Kwartawaty et al., 2024).

### ***3.2 Flexibility in industrial environments***

One of the biggest challenges is Generation Z's desire for hybrid work and time flexibility. (Osorio and Madero, 2025) states that the possibility of working at least partially in a hybrid mode increases the loyalty of Generation Z, but in industrial production this is often technically unfeasible. The challenge for managers is therefore to find alternative forms of flexibility. (Stawiarska et al., 2025) propose, in the context of the automotive industry, the use of digital tools for autonomous change management by employees themselves. Human resource management systems with Generation Z in mind must balance productivity and well-being, with well-being not being perceived as a benefit, but as a strategic priority (Muchtar, 2025).

### ***3.3 Soft skills development***

(Visser and Terblanche, 2025) highlights in their study that while Generation Z is technologically savvy, they often lack certain social and communication soft skills that are essential for working in teams. Performance management should therefore not only focus on technical KPIs, but also on developing empathy, conflict resolution and critical thinking. According to (Zahra et al., 2025) developing soft skills also increases employees' overall resistance to stress.

### ***3.4 A model of self-determination in industry for Generation Z***

Traditional self-determination theory works with three basic needs: autonomy, competence, and relationships. Although **autonomy** in production is limited, Generation Z employees need to feel an influence on

subtasks or planning changes. **Competencies** are the result of education and development, which is one of the important aspects for Generation Z. **Relationships** are perceived primarily as a supportive community that goes beyond the professional framework (Pauli and Dudek, 2025). The (Salvadorinho et al., 2024) study proves that for industrial companies, it is necessary to expand this model by three more factors to fully reflect the needs of Generation Z: purpose, flow and achievement. **Purpose** is what gives Generation Z employees a sense of meaning in their work. It is a clear connection between individual work and global company goals, for example in the area of sustainability. **Flow** is important from the point of view of concentration on work. Therefore, it is important to strive to create an environment where technology helps to achieve deep concentration. **Achieving success** in their work is another characteristic of Generation Z. Employees of this generation need immediate recognition and visible results of their work. If an industrial company can integrate these factors into its performance management system, it records a 20-30% higher retention rate of young employees (Salvadorinho et al., 2024).

Based on a synthesis of sources (Muchtar, 2025; Salvadorinho et al., 2024; Zahra et al., 2025) a table of parameters for managing employee performance in industry using the traditional and modern approaches was compiled (Table 1).

**Table 1: Comparison of traditional and modern approaches to performance management in industry**

Parameter	Traditional management	Modern Generation Z management	Expected impact on Generation Z
<b>Success metric</b>	Quantity, norm, attendance	Quality, innovation, achieving goals	Higher satisfaction and lower error rate
<b>Feedback</b>	Once a year, formal	Continuous, real-time, digital	Faster skill development
<b>Control tools</b>	Hierarchical supervision	Self-management, digital dashboards	A sense of trust and responsibility
<b>Benefit system</b>	Fixed salary, bonuses	Salary, flexibility, well-being	Higher talent retention
<b>Working hours</b>	Fixed changes	Striving for flexible models	Improving work-life balance

Source: (own elaboration, 2026)

As Table 1 shows, Generation Z needs a different approach to performance management. They prefer regular feedback, which can lead to faster skill development. They also prefer flexibility, which allows them to maintain a work-life balance, which supports their overall satisfaction and well-being.

#### 4. DISCUSSION

Findings show that traditional performance management systems in industry, based on annual reviews and fixed bonuses, are ineffective for Generation Z. Misalignment between employee values and corporate structures leads to stress and anxiety, as confirmed by the latest data from the (Deloitte, 2025) survey, where up to 40% of young employees feel constant pressure. In contrast, managers should focus on **transforming feedback**. Replace annual interviews with ongoing feedback through digital platforms and real-time feedback (Muchtart, 2025). Generation Z needs to know regularly about how they work. For Generation Z, **the purpose of specific activities** is important. Managers need to better communicate the impact of production on environmental and social goals. Connecting work with protecting the planet increases Generation Z's motivation by more than 15% (Deloitte, 2025). If working from home is not possible, the company should implement flexible shift starts or a time bank that the employee can manage via a mobile application (Stawiarska et al., 2025). This will ensure some **micro-flexibility**. **Supporting mental health** is also important. Given the high levels of stress identified in Generation Z (Deloitte, 2025), mental health support programs should be integrated directly into the company culture (Muchtart, 2025). (Holban and Bedrule-Grigoruță, 2025) adds that a successful talent management strategy for Generation Z employees must be personalized. A uniform approach to performance management no longer works in the complex environment of Smart Industry.

Table 2 presents five identified challenges, from five different authors, with proposed solutions for managing the performance of Generation Z employees in industrial enterprises.

**Table 2: Challenges and proposed solutions in managing the performance of Generation Z employees in industrial enterprises**

Identified challenge	Author/Year	Proposed solution
<b>High turnover in the first year</b>	(Stawiarska et al., 2025)	Digital onboarding process for new employees and reverse mentoring of seniors by juniors
<b>Disinterest in overtime</b>	(Deloitte, 2025)	Transition from remuneration for time to remuneration for achieved goals and quality
<b>Technological frustration</b>	(Salvadorinho et al., 2024)	Modernizing corporate digital interfaces towards smartphone intuitiveness
<b>Low emotional attachment</b>	(Lee and Lim, 2024)	Regular weekly informal feedback instead of annual evaluation
<b>Mental health</b>	(Muchtart, 2025)	Introduction of programs to support well-being directly in the factory premises (rest zones)

Source: (own elaboration, 2026)

Table 2 shows that industrial companies should focus on using technology more effectively in working with Generation Z. At the same time, they should ensure that Generation Z employees are provided with ongoing feedback, which will enable these employees to develop more quickly. In the area of mental health, this primarily involves supporting programs that help Generation Z employees maintain their psychological well-being.

## 5. CONCLUSION

Managing the performance of Generation Z employees in industrial enterprises is a complex challenge that requires a shift away from a mechanical understanding of work. This article has shown that performance in this generation is closely linked to the fulfillment of psychological needs, especially autonomy, meaningfulness, and technological comfort.

The contribution of the article is an overview of modern approaches to human resource management, which show that Smart Industry is not only about machines, but especially about the people who control them. It is crucial for industrial companies to adopt a transformational leadership style, characterized by motivating employees to extraordinary results through a shared vision, innovation and an individual approach to each employee. At the same time, they adapt their processes to provide space for flexibility and personal development of the employee.

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## DETERMINANTS OF ARTIFICIAL INTELLIGENCE ADOPTION IN HIGHER EDUCATION: EVIDENCE FROM GENERATION Z STUDENTS

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**Abstract:** *This study investigates the determinants influencing the perception of artificial intelligence in higher education among Generation Z students. Based on the Technology Acceptance Model, a conceptual model including Perceived Informedness, Perceived Knowledge, Perceived Usefulness, and Risk Perceived was tested using PLS-SEM. The results show that perceived knowledge, usefulness, and informedness significantly affect AI perception, whereas perceived risk does not have a significant direct effect. The findings suggest that cognitive and utility-related factors play a dominant role in AI adoption among Generation Z. The study highlights the importance of AI literacy and informed awareness for the effective integration of artificial intelligence in higher education.*

**Key words:** *Artificial Intelligence, Knowledge, Usefulness, Risk Perceived, Higher Education, PLS-SEM*

**JEL Classification:** *O33, C83, I23*

### 1. INTRODUCTION

In recent years, the term Artificial Intelligence (AI) has been used increasingly frequently. AI is transforming everything we have been accustomed to so far, and the current question is no longer “whether AI will change our society,” but rather “how AI will change our society.” The concept of artificial intelligence was introduced as early as the mid-20th century, and its meaning has gradually evolved since then. In general, AI is understood as a field of computer science focused on developing systems capable of performing tasks that traditionally require human intelligence, such as learning, decision-making, or information processing (Holmes, 2023). It is an interdisciplinary domain, which is why the literature contains multiple definitions emphasizing different aspects of AI systems (Richter, 2023; Volná & Kotyrba, 2013). Generative artificial intelligence represents a group of AI systems whose goal is not only to

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analyse or classify input data but also to create new content based on learned patterns. Unlike traditional predictive AI approaches, generative models are already capable of producing new texts, images, sounds, or other forms of digital content (Richter, 2023; GAO, 2023). Generative AI is built on several types of models that differ according to the type of processed data and the method of generation. Among the most prominent are large language models, generative adversarial networks, variational autoencoders, and diffusion models. Their application depends on the specific context and the desired type of output (Richter, 2023; Sengar et al., 2025).

A common feature of all generative models is their ability to create new content based on learned patterns rather than mechanically copying existing material. This characteristic significantly expands the potential uses of generative AI, while simultaneously increasing the demands for its responsible use. The principles of content generation form the theoretical foundation for subsequent subchapters, which address types of generated content, generative AI tools, and areas of application (Sengar et al., 2025). Generative artificial intelligence is being applied across various sectors of society, including business practice, creative industries, information technology, healthcare, as well as the public sector. Its ability to work with diverse types of content and automate work tasks makes it a flexible technology that organisations across different sectors consider a tool for improving efficiency and gradually integrate into their processes (Sengar et al., 2025; Uddin et al., 2025). Within the context of this thesis, particular attention is given to the field of education, where generative AI is advancing at an exceptionally rapid pace. Generative tools are widely accessible, and students frequently use them as part of their everyday learning activities, even without formal integration into teaching. This development influences learning methods, the handling of information, and approaches to solving academic tasks (Miao & Holmes, 2021; Marx et al., 2023).

Research on the adoption of artificial intelligence by Generation Z primarily focuses on identifying the factors influencing the acceptance and use of AI technologies. Generation Z is often referred to as “digital natives,” characterized by a high level of digital literacy, technological adaptability, and a positive attitude toward innovation. Empirical studies indicate that the main determinants of AI adoption include perceived usefulness, ease of use, and the level of knowledge and awareness about the technology. These factors are derived from TAM models and their extensions, according to which perceived usefulness and perceived ease of use represent key determinants of technology acceptance (Tbaishat et al., 2026; Güngören et al., 2026). However, the rapid expansion of generative AI into the educational environment simultaneously creates new challenges for educational institutions. There is a growing need to

establish rules for AI use, respond to changes in student behaviour, and determine how generative tools can be meaningfully integrated into educational processes. The study suggests these below mentioned research questions:

- RQ<sub>1</sub>: What is the impact of subjective factors of technology adoption, perceived informedness, perceived knowledge, perceived usefulness, and perceived risk, on the perception of the integration of artificial intelligence into higher education?
- RQ<sub>2</sub>: Which factors represent the strongest determinants of the acceptance and perception of artificial intelligence in higher education among Generation Z students?

## **2. DEVELOPMENT OF HYPOTHESES BASED ON THEORY**

Educational management focuses on the planning, organization, implementation, and evaluation of educational activities at the level of schools, educational systems, or individual educational programmes. At present, this field is increasingly influenced by digital transformation, with artificial intelligence emerging as a significant component of this process. The integration of AI into educational management does not merely represent a technological innovation; rather, it signifies a fundamental shift in decision-making processes, data utilisation, and the management of educational quality. From the perspective of educational institutions, artificial intelligence can be perceived as a tool that supports both strategic and operational management.

### ***2.1 Artificial Intelligence in Higher Education (AI in HE)***

AI systems enable the processing of large volumes of data related to students, teachers, and educational processes, which would be difficult or impossible to evaluate effectively through manual means. Based on such data, school management can identify trends, weaknesses in teaching practices, or at-risk student groups, thereby supporting more informed decision-making. A significant area of AI application in educational management is the analysis of student learning behaviour and performance. Predictive analytics tools powered by artificial intelligence can identify the likelihood of academic failure, early dropout, or declining motivation. This allows school management to respond proactively by implementing support measures, adjusting teaching strategies, or introducing more targeted pedagogical interventions.

Another important area concerns the optimisation of educational processes and resources. Artificial intelligence can support scheduling, teacher allocation, classroom capacity planning, and the more efficient use of financial and material resources. In this context, AI contributes to increased institutional efficiency and better alignment between educational

objectives and available resources. Within quality management in education, AI enables more systematic evaluation of teaching and student feedback. Automated analysis of surveys, evaluations, and open-ended responses provides management with deeper insights into student satisfaction, perceived teaching quality, and areas requiring improvement. These outputs can serve as a foundation for strategic decision-making, accreditation processes, and long-term institutional planning.

Particular attention should also be given to the impact of generative artificial intelligence on educational management. Generative tools can be used in the creation of learning materials, internal guidelines, analytical reports, and communication outputs directed at students and the public. At the same time, they impose increased demands on the establishment of clear rules governing their use to preserve academic integrity, transparency, and ethical standards. From a management perspective, it is therefore essential not only to introduce AI tools technically but also to establish a clear framework for their application. This includes defining internal policies, providing training for academic and administrative staff, and systematically enhancing students' AI literacy.

Educational management plays a crucial role in determining whether artificial intelligence will be perceived as a threat or as a strategic instrument for the development of the educational system. Within the context of this study, educational management is particularly important in supporting students' awareness of artificial intelligence, fostering critical thinking, and strengthening their ability to distinguish AI-generated content. The manner in which educational institutions respond to the expansion of generative AI directly influences students' attitudes, their perception of risks and benefits associated with AI, as well as their preparedness to operate in a digitally and technologically complex environment.

## ***2.2 Perceived Informedness (PI)***

The successful implementation of artificial intelligence in education does not depend solely on technological availability, but also on the ability of individual stakeholders to understand the principles underlying these tools and their implications. Awareness of AI, understood as knowledge of the existence, capabilities, functions, and limitations of AI technologies, represents a key prerequisite for their effective use. A lack of information or insufficient AI literacy may lead to concerns, misconceptions, or resistance toward the technology, which in turn can hinder its adoption and integration into teaching practices. Empirical evidence supports this assumption: studies in the field of online education identify uneven levels of awareness of AI tools as a significant factor influencing their practical acceptance among students and teachers (Khetan, 2025). The level of

awareness and digital literacy among educators, students, and educational leaders constitutes an important determinant affecting the adoption and use of AI technologies. Research indicates that insufficient understanding of how AI functions, as well as of its possibilities and limitations, may result in the rejection of these tools or their inappropriate use (Holmes, Bialik, & Fadel, 2019). Conversely, higher levels of awareness contribute to increased trust in AI systems and support their responsible and effective application. Deficiencies in awareness may not only slow technological adoption but also reduce the quality of learning and lead to inconsistent use of AI within educational processes.

The scholarly literature further emphasises the importance of developing so-called AI literacy, which encompasses not only technical knowledge but also an understanding of the ethical, legal, and societal aspects of artificial intelligence. International organisations highlight that without systematic education in AI, meaningful integration of these technologies into educational practice cannot be ensured (UNESCO, 2021). Awareness of both the risks and benefits of AI therefore plays a crucial role in decision-making regarding its use in educational settings. Insufficient awareness may result in unrealistic expectations, fears of teacher replacement, or an overestimation of AI capabilities, while simultaneously increasing the risk of inappropriate or unethical use of AI tools. By contrast, well-informed users are able to critically evaluate the suitability of specific AI solutions and integrate them into teaching in ways that support pedagogical objectives. Based on the above considerations, the following hypothesis can be formulated:

H<sub>1</sub>: Perceived Informedness (PI) has a positive effect on the acceptance of Artificial intelligence in higher education (AI in HE).

### ***2.3 Perceived Knowledge (PK)***

AI systems are applied in educational environments in various forms, ranging from intelligent tutoring systems to analytical tools that support teachers' decision-making processes. However, the effective use of these technologies requires a fundamental understanding of their functioning, capabilities, and limitations. Scholarly literature indicates that insufficient knowledge of AI technologies may lead to their improper use, ineffective integration into teaching, or even the complete rejection of such tools (Holmes, Bialik, & Fadel, 2019). In this context, knowledge does not refer solely to technical competencies, but also to the ability to critically evaluate the suitability of specific AI solutions in relation to pedagogical objectives and the specific characteristics of the educational process.

López-Costa et al. (2025), in an empirical study, found that AI knowledge is one of the strongest and statistically significant predictors of teachers'

adoption of AI technologies — meaning that higher levels of knowledge are associated with more frequent use of AI in teaching practice. Within school environments, AI knowledge therefore becomes an important factor influencing decisions regarding its practical implementation. Furthermore, the level of AI literacy significantly affects users' attitudes and their intention to use artificial intelligence tools in education, as higher levels of knowledge reduce uncertainty and support technological adoption (Ng et al., 2021). Based on the above considerations, the following hypothesis can be formulated:

H<sub>2</sub>: Perceived Knowledge (PK) has a positive effect on the acceptance of Artificial intelligence in higher education (AI in HE).

#### **2.4 Perceived Usefulness (PU)**

One of the key factors influencing the adoption and use of new technologies in education is their perceived usefulness. In the context of artificial intelligence (AI), usefulness is primarily reflected in the ability of technologies to enhance teaching efficiency, support personalised learning, and reduce the administrative workload of educators. Users' perceptions of the benefits of AI play a decisive role in decisions regarding its practical implementation. Theoretical models of technology acceptance indicate that perceived usefulness is among the most significant determinants of the use of technological innovations. According to the Technology Acceptance Model (TAM), the belief that a technology enhances work or learning performance represents one of the main prerequisites for its adoption. This concept is also applicable to the educational domain, where educators and students consider the extent to which AI tools genuinely contribute to achieving educational objectives. For example, a study examining the adoption of generative AI among pre-service teachers found that perceived usefulness is among the strongest predictors of the intention to use AI tools in teaching, and together with perceived ease of use significantly influences behavioural intentions toward AI adoption (Liu, Wang, & Lei, 2025). Similarly, further research conducted among university students confirms that the perceived usefulness of AI systems significantly affects users' attitudes and their actual use in academic activities (Bećirović et al., 2025). Empirical studies in the field of educational technology suggest that when users perceive AI as a useful tool supporting learning and teaching, they are more willing to actively use and integrate these technologies into everyday practice. Conversely, when the usefulness of AI is questioned or insufficiently demonstrated, the level of its adoption remains limited. Research among teachers has shown that those who perceive AI tools as genuinely beneficial for improving teaching effectiveness tend to use them more frequently in practice, whereas low perceived usefulness acts as a barrier

to implementation (Granström, 2025). Based on these theoretical and empirical foundations, the following hypothesis can be formulated:

H<sub>3</sub>: Perceived Usefulness (PU) has a positive effect on the acceptance of Artificial intelligence in higher education (AI in HE).

### **2.5 Risk Perceived (RP)**

One of the key issues in the current debate on the use of artificial intelligence in education concerns the security challenges and risks associated with its implementation. AI systems in educational environments process large volumes of sensitive student data, often including personal and behavioural information, which increases demands for privacy protection and cybersecurity (UNESCO, 2021). Beyond data protection, scholarly discussions also focus on the risks of automated decision-making and the lack of algorithmic transparency. Research highlights that decisions made by AI systems may be influenced by the quality of input data and algorithmic design, potentially leading to unfair assessments or discriminatory outcomes (Mittelstadt et al., 2016). Recent studies further suggest that concerns related to data security, algorithmic transparency, and the potential misuse of technology represent major factors influencing educators' and students' willingness to adopt AI in educational processes. For instance, a review study on the implementation of generative AI in education indicates that issues of security, trust, and data protection constitute significant barriers to the adoption of AI tools, particularly in educational settings that handle sensitive information (Kasneci et al., 2023). For this reason, international organisations emphasise the importance of maintaining human oversight, transparency, and accountability in the use of AI within educational contexts (OECD, 2019). As a consequence of these security and ethical concerns, safety has become one of the decisive factors influencing decisions regarding the extent and manner of AI use in education. Insufficiently secured or non-transparent AI systems may lead to a loss of trust among educational institutions, educators, students, and parents, thereby limiting their practical implementation (Floridi et al., 2018). Security-related considerations therefore play a significant role in shaping educational stakeholders' approaches to the adoption of AI technologies. Based on the above considerations, the following hypothesis can be formulated:

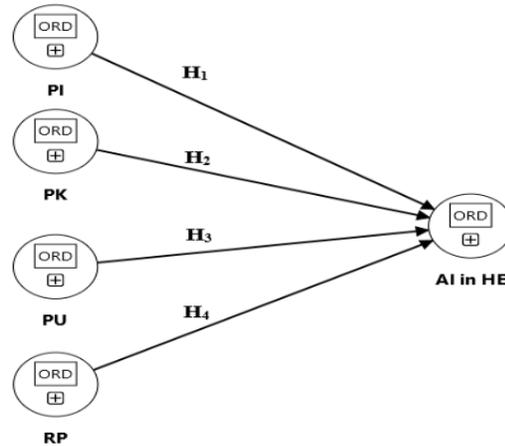
H<sub>4</sub>: Risk Perceived has a positive effect on the acceptance of Artificial intelligence in higher education (AI in HE).

## **3 RESEARCH METHODOLOGY**

### 3.1 Measure instrument

Based on the above theory, a conceptual model (Fig.1) was developed to assess the interrelationships between constructs Perceived Informedness (PI), Perceived Knowledge (PK), Perceived Usefulness (PU), Risk Perceived (RP) and depend variable Artificial Intelligence in Higher Education (AI in HE). The wording of the hypotheses is indicated on the assumed relationships.

Figure 1: Conceptual framework (model)



Source: own elaboration (2026)

The aim of the article is to quantify the outlined relationships and verify the formulated hypotheses. For the purposes of evaluating the proposed conceptual model in this study, selected data from a questionnaire survey were used. The development of an appropriate instrument for assessing students' acceptance of artificial intelligence in higher education was part of a study on the acceptance and application of AI-supported tools in education. The operationalization of the constructs in the proposed model was based on findings from the literature review. The measurement tool used to operationalize the constructs of the theoretical framework was a multi-item measurement. All constructs were evaluated and by using previously validated scales and was discussed in the literature section. The questionnaire consisted of a total of 25 items. Each item was rated by the respondent using a "five-point" standardized Likert-type scale ranging from 1 to 5 (strongly disagree, disagree, neither agree nor disagree, agree, strongly agree). The investigated constructs were identified in a pilot study based on exploratory factor analysis.

### **3.2 Data collection**

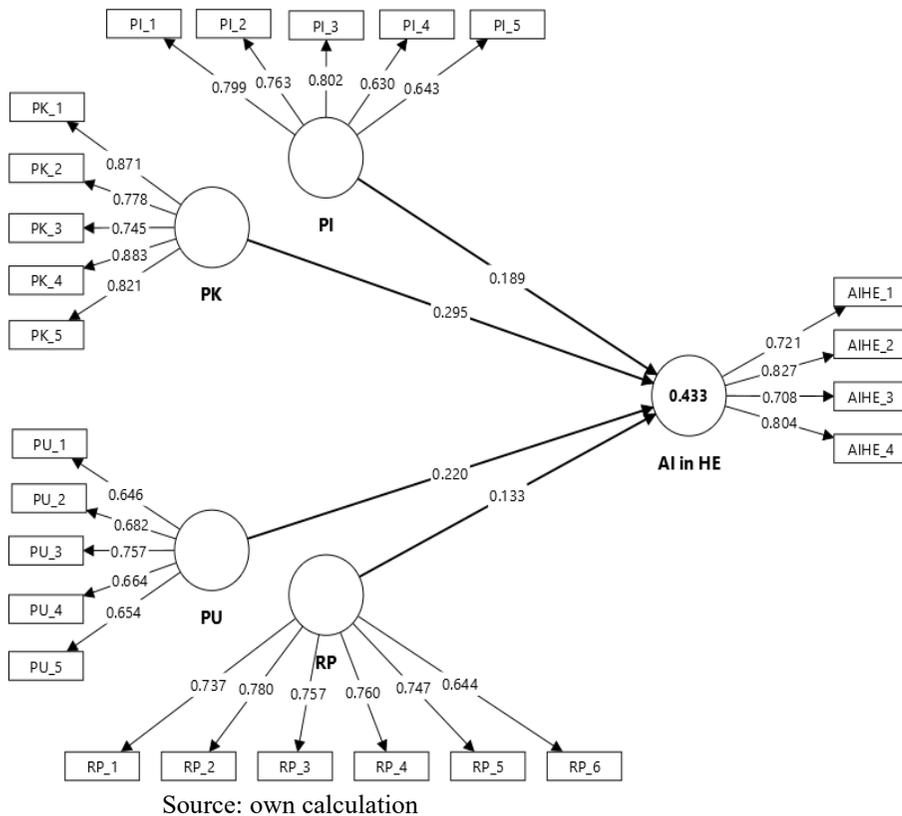
A data collection survey was distributed. The sample size analysed was 130, which corresponded to a return rate of 71%. The questionnaire was pilot-tested on a sample of university students in 2025. The appropriate structure of the proposed questionnaire was verified using exploratory factor analysis. Structural equation modeling with the method of partial least squares SmartPLS 4 (Ringle, 2024; Hair et al., 2024) was used for quantitative data analysis. Due to its robustness, PLS-SEM is the preferred and widely used method of analysis. There are several reasons for using PLS-SEM in this study. Predictive nature of the study, the complexity of the structural model with a larger number of constructs and indicators. A significant reason for applying the SEM-PLS method was the smaller sample size, the ordinal nature of the investigated variables, and the distribution function of the experimental data.

## **4. RESULTS**

The model, analyzed in the SmartPLS 4, was based on the conceptual framework shown in Figure 2. The abbreviations explained in the theoretical part are used for the investigated constructs. The comprehensive evaluated model is shown in the following figure. In the section graph, links between the constructs are identified together with the items that saturated the individual constructs.

The data analysis process was conducted according to the recommended steps (Ringle, 2024). In the first step, the measurement model is evaluated. In the case of satisfactory results, the analysis of the internal structural model follows and then the prediction of the endogenous variable. In each step, the calculated values of individual criteria with threshold values are assessed. According to the recommendations, when assessing the significance of individual calculated measures, it is also recommended to carry out bootstrapping.

**Figure 2: PLS-SEM results from SmartPLS**



The model estimation uses PLS-SEM algorithm, the path weighting scheme, a maximum of 3000 iterations, a stop criterion of  $10^{-7}$ , and equal initial weights. It was verified that after running the algorithm converged and the stop criterion was met.

#### 4.1 Assessment of the measurement reflective model

The nature of the constructs in the external model, from the point of view of the operationalization of the constructs by items, was reflective. Examining the measurement model includes indicator reliability, internal consistency reliability, convergent validity (CV) and discriminant validity (DV). Indicator reliability is assessed using the values of the outer loadings and the AVE coefficient. Internal consistency reliability assesses the extent to which the items measure a specific latent construct. Composite reliability ( $\rho_c$ ) was assessed as a measure of internal consistency. The results are shown in the following table.

**Table 1: PLS-SEM assessment results of reflective measurement models**

Construct	Item	Convergent validity		Internal consistency reliability		
		Loadings	AVE	Cronbach's $\alpha$	reliability $\rho_A$	reliability $\rho_C$
<b>PI</b>	PI_1	0.799	0.535	0.779	0.789	0.850
	PI_2	0.763				
	PI_3	0.802				
	PI_4	0.630				
	PI_5	0.643				
<b>PK</b>	PK_1	0.871	0.674	0.878	0.893	0.912
	PK_2	0.778				
	PK_3	0.745				
	PK_4	0.883				
	RE_5	0.821				
<b>PU</b>	PU_1	0.646	0.465	0.718	0.724	0.812
	PU_2	0.682				
	PU_3	0.757				
	PU_4	0.664				
	PU_5	0.654				
<b>RP</b>	RP_1	0.737	0.546	0.834	0.841	0.878
	RP_2	0.780				
	RP_3	0.757				
	RP_4	0.760				
	RP_5	0.747				
	RP_6	0.644				
<b>AI in HE</b>	AIHE_1	0.721	0.588	0.767	0.788	0.850
	AIHE_2	0.827				
	AIHE_3	0.708				
	AIHE_4	0.804				

Source: own calculation

The assessment of CV requires checking the outer loading values of the items and the average variance extracted (AVE). The recommended limit value for external loads is  $\lambda > 0.708$ . This ensures that the construct explains more than 50% of the variance of the indicator. Some items had loading values ( $\lambda$ ) lower than 0.7; however, after expert evaluation, these items were retained, and one item was removed AIHE\_5. An acceptable AVE value is 0.50 or higher, which means that the construct explains at least 50 percent of the variance of the items. The PU construct has an AVE value lower than the required threshold, whereas the other constructs meet the recommended AVE value. This confirmed the convergent validity of the constructs. The last step in assessing the suitability of the measurement model is DV. DV to the extent that the constructs used in the model are distinct from each other (Hair et al., 2024). Three methods were applied to: Fornell and Larcker criterion, the Heterotrait-Monotrait Ratio

(HTMT) and cross loadings of items. Fornell and Larcker's method is used to compare the correlation between the constructs and the square root of AVE for that construct. The results are in Table 2.

**Table 2: Fornell-Larcker criterion for assessing DV**

	AI in HE	PI	PK	PU	RP
AI in HE	<b>0.767</b>				
PI	0.517	<b>0.731</b>			
PK	0.568	0.527	<b>0.821</b>		
PU	0.484	0.486	0.450	<b>0.682</b>	
RP	0.454	0.486	0.557	0.294	0.739

Source: own calculation

It is apparent from the values in Table 2 that the square root value of AVE for a latent variable is higher than the correlation values provided in the rows and columns. Henseler et al. (2015) suggested using the criterion HTMT, which is defined as the average value of item correlations across constructs relative to the average (geometric) correlations for items measuring the same construct. Values were obtained from bootstrapping procedure with 5000 subsamples with percentile bootstrap confidence interval, and one-tailed testing at the 0.05 significance level.

**Table 3: HTMT criterion for assessing discriminant validity**

	Heterotrait-monotrait ratio (HTMT)
PI <-> AI in HE	0,652
PK <-> AI in HE	0,667
PK <-> PI	0,632
PU <-> AI in HE	0,620
PU <-> PI	0,592
PU <-> PK	0,544
RP <-> AI in HE	0,543
RP <-> PI	0,607
RP <-> PK	0,648
RP <-> PU	0,367

Source: own calculation

The problem with discriminant validity is present when the HTMT value is high (0.90 or in some cases 0.85). For all pairs of constructs in the model, the HTMT values are within the acceptable range. The values from the table of cross-loadings point to the fact of acceptable discriminant validity. In conclusion, the overall results of the measurement model indicated adequate internal consistency reliability, convergent validity, and discriminant validity. Before assessing the structural model, in addition to validity and reliability, multicollinearity must be checked.

Multicollinearity can be assessed through the variance inflation factor (VIF). Recommends a maximum acceptable value of 3.0 for multicollinearity. The results of PI -> AI in HE (VIF=1.672), PK -> AI in HE (VIF=2.444), PU -> AI in HE (VIF=1.407) and RP -> AI in HE (VIF=1.568) indicate that the problem of multicollinearity between latent constructs was not identified.

#### 4.2 Evaluation of the structural model (internal model)

The structural model assesses the causal relationship between constructs, using paths coefficients. When evaluating statistical significance, it is recommended to use the bootstrap method with repeated selection. The measurement model is an accurate predictor of the formulated hypotheses. Assessment involves examining the relevance of the model's projections and the connections between the constructs. Correlation between two variables ( $R^2$ ), path coefficient ( $\beta$ ) and T-statistic value, effect size ( $f^2$ ), predictive relevance of the model ( $Q^2$ ) are key standards for evaluating the internal structural model. The results of the evaluation of the structural model are in the following table.

**Table 4. Path coefficients of the structural model and significance testing results**

Path	$\beta$	T statistics ( O/STDEV)	p values	Significant ( $p < 0.05$ )?
<b>Direct effect</b>				
H <sub>1</sub> : PI -> AI in HE	0.204	2.206	0.027	Yes
H <sub>2</sub> : PK -> AI in HE	0.280	3.147	0.002	Yes
H <sub>3</sub> : PU -> AI in HE	0.226	2.674	0.008	Yes
H <sub>3</sub> : RP -> AI in HE	0.132	1.658	0.097	No

Source: own calculation

The statistical significance of the formulated hypotheses in the theoretical part of the study (H<sub>1</sub> – H<sub>4</sub>) was assessed using path coefficients, i.e. the  $\beta$  value.  $\beta$  symbol represented the predicted variability in the dependent construct. The higher the values of the  $\beta$  coefficient, the more significant the influence on the endogenous latent construct. The level of significance of the value is confirmed using the T statistic. The results assess the statistical significance of the direct relationship between the investigated constructs. The relationships between the independent constructs PI, PK, and PU and the dependent construct AI in HE were found to be statistically significant at the 0.05 significance level. The estimated regression coefficients indicate that the examined causal relationships are moderately significant. The effect of the Perceived Risk construct was quantified as statistically non-significant. In addition to the above criteria,

the internal model was also assessed based on the coefficient of determination ( $R^2$ ), effect size ( $f^2$ ) and predictive relevance ( $Q^2$ ) values. The general effect size and variance explained in the endogenous construct for the structural model is measured by the coefficient of determination, which also serves as an indicator of the model's predictive power. An  $R^2$  value  $> 0.75$  is considered substantial, an  $R^2$  value greater than 0.50 is considered moderate, and an  $R^2$  value less than 0.26 is judged to be weak. For the dependent construct AI in HE, the coefficient of determination is  $R^2 = 0.433$ , which can be interpreted as a moderate value and is statistically significant ( $p < 0.000$ ). The magnitude of the effect of each exogenous latent construct on the endogenous latent construct is represented by  $f^2$ . The recommended thresholds for  $f^2$  are 0.35 for a high effect, 0.15 for a moderate effect, and 0.02 for a weak effect. In our case, a weak effect of the RP construct can be observed, but this is also suggested by previous findings. There are inner model collinearity statistics (VIF): PI  $\rightarrow$  AI in HE (1.672), PK  $\rightarrow$  AI in HE (1.768), PU  $\rightarrow$  AI in HE (1.407) and RP  $\rightarrow$  AI in HE (1.568). Finally, the goodness of fit and predictive ability of the model was assessed. Standardized Root Mean Square Residual SRMR = 0.100, what mean acceptable fit. Additional criteria Chi-square (742.721) and NFI (0.823), are used to validate the overall structural model. The values of all calculated metrics indicate good model fit (Hair et al., 2024). The predictive power of the estimated model was assessed using the  $Q^2$  statistic, which is appropriate in and reflective measurement model.  $Q^2$  (AI in HE) = 0.381. According to Hair et al. (2024), this indicates excellent predictive power of the model. Further proof is carried out by comparing the RMSE values. Subtraction results between RMSE on PLS-SEM and LM is negative. This indicates that PLS-SEM produces a smaller prediction error and vice versa.

## **5 DISCUSSION**

The empirical research produced interesting and novel findings. Based on previous studies and a literature review, a model consisting of five constructs and the proposed direct relationships among them was tested. The quality of the proposed model was assessed as adequate according to the evaluated criteria; therefore, the results can be meaningfully interpreted. These findings partially correspond to the results reported in the study by Güngören et al. (2026). Key target construct Artificial Intelligence in Higher Education (4 items) of SEM on the right-hand side of the PLS path model, was examined as a dependent latent variable influenced by four variables: Perceived Informedness (5 items), Perceived Knowledge (5 items), Perceived Usefulness (5 items), Risk Perceived (5 items). Perceived Informedness has a direct effect on Artificial Intelligence in Higher Education (PI  $\rightarrow$  AI in HE ;  $\beta = 0.204$ ;  $p = 0.027$ ). The effect size is moderate but statistically significant. Therefore, hypothesis H1 is not rejected. The strongest direct effect on Artificial Intelligence in Higher Education is exerted by students' Perceived Knowledge. (PK  $\rightarrow$  AI in HE;  $\beta = 0.280$ ;  $p =$

0.002), therefore  $H_2$  is not is not rejected. A direct significant relationship was also quantified between Perceived Usefulness and Artificial Intelligence in Higher Education ( $\beta = 0.226$ ;  $p = 0.008$ ). Based on the obtained results, hypothesis  $H_3$  is not rejected. Value of path coefficient of relationship  $RP \rightarrow AI$  in HE is low ( $\beta = 0.132$ ;  $p > 0.05$ ), Therefore, hypothesis  $H_4$  is rejected. This finding may appear unexpected; however, given the examined sample of Generation Z respondents, it is not unusual. The results of the structural modeling showed that the perceived risk of artificial intelligence tools does not have a statistically significant direct effect on the perception of AI integration into higher education. This result is both methodologically and theoretically consistent in the context of Generation Z. For this generation, artificial intelligence technologies are not perceived as new or disruptive, but rather represent a natural part of everyday interaction with systems such as ChatGPT, Google Assistant, or TikTok.

Based on the results, two research questions formulated in the introduction can be addressed in the conclusion. In response to  $RQ_1$ , it can be stated that the subjective perception of the analyzed factors, perceived informedness, perceived knowledge, and perceived usefulness, is at an average level. The effect of perceived risk in the sample appeared to be non-significant. The strongest factor was students' perceived knowledge, thereby answering research question  $RQ_2$ . Given the need for research focused on analyzing factors of subjective perceptions of knowledge, informedness, usefulness, and risk related to the implementation of artificial intelligence in higher education, several causal relationships between PI, PK, PU, and AI in HE were confirmed. The data obtained from the questionnaire survey conducted among university students, representing Generation Z, largely support the proposed research model. The results of this study revealed that the positive subjective perception of knowledge, skills, informedness, and usefulness of AI represents a significant predictor of AI perception in higher education.

## **6 LIMITATIONS AND FUTURE RESEARCH**

The present study provides new insights into the factors influencing the perception of AI in higher education among Generation Z students. However, several research limitations should be considered. First, the study was conducted on a relatively small sample of respondents, which may limit the generalizability of the results. Although the PLS-SEM method is suitable for smaller research samples, future studies should employ larger and more representative samples or conduct longitudinal research. Second, the empirical data were collected using a self-report questionnaire, which may introduce response bias. Future research could combine survey data with experimental designs, behavioral data, or qualitative methods such as interviews or focus groups, which would allow for a deeper understanding of students' attitudes toward the use of AI. Third, the research was conducted within the context of a single university, which limits the comparability of the findings. Another

limitation is the model's exclusive focus on direct relationships between constructs. The model could be extended by including moderating or mediating variables, such as trust in AI, digital literacy, technological self-efficacy, ethical concerns, or experience with AI tools. The inclusion of these factors could contribute to a better understanding of the mechanisms underlying AI adoption in the educational environment. Future research could also compare the attitudes of Generation Z with other age cohorts, which would enable the identification of generational differences in the perception of risk, usefulness, and acceptance of AI technologies. Despite these limitations, the study provides a relevant foundation for further research on the adoption of artificial intelligence in higher education and highlights the importance of cognitive factors, informed awareness, and knowledge in shaping students' attitudes toward AI technologies.

#### **4. CONCLUSION**

The present study examined the determinants influencing the perception of Artificial Intelligence in Higher Education among Generation Z students. Developed structural model incorporating Perceived Informedness, Knowledge, Usefulness, and Risk Perceived was empirically tested using PLS-SEM. The results confirmed that Perceived Knowledge represents the strongest predictor of AI perception in higher education, followed by Perceived Usefulness and Perceived Informedness. These findings emphasize that cognitive factors, particularly students' understanding of AI principles and their awareness of its functionalities and benefits, significantly shape their acceptance of AI integration in educational processes. Interestingly, the construct Risk Perceived did not demonstrate a statistically significant direct effect on AI perception in higher education. Although risk and security concerns are frequently identified in the literature as barriers to AI adoption, this result appears theoretically consistent when considering the specific characteristics of Generation Z. As a cohort of digital natives, Generation Z has grown up in a highly digitized, algorithm-driven environment where AI-based systems are embedded in everyday interactions. For this generation, technological risk is often normalized and integrated into routine digital behavior. Therefore, the non-significant direct relationship between Risk Perceived and AI in Higher Education should not be interpreted as the absence of concern, but rather as evidence that risk considerations are outweighed by perceived utility and knowledge-related factors. From a theoretical perspective, this study contributes to AI adoption research by demonstrating that traditional risk-based inhibition mechanisms may weaken in digitally mature populations. From a practical standpoint, the findings suggest that higher education institutions should prioritize strengthening AI literacy, informed awareness, and demonstrable usefulness of AI tools rather than focusing exclusively on risk communication strategies. In conclusion, the

integration of generative AI into higher education is primarily driven by cognitive and utility-based perceptions among Generation Z students. Ensuring responsible, transparent, and pedagogically meaningful implementation of AI technologies remains essential, yet fostering knowledge and informed understanding appears to be the most effective pathway to sustainable AI adoption in contemporary academic environments.

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## THE GAMIFIED CLASSROOM: HOW V4 CAN LEARN FROM GAME UX AND NARRATIVE DESIGN

Ondřej KLÍMA<sup>1</sup>

**Abstract:** *This paper examines whether gamification can be constructively aligned with epistemic objectives in theory-intensive higher education. While meta-analytic evidence shows consistent engagement gains from gamification, effects on deep learning remain heterogeneous and discipline-dependent. Addressing a gap in research on humanities and social science contexts, I designed a gamified introductory sociology course structured around competing theoretical factions, narrative framing, and experience-point progression with positive-only grading effects. The design was grounded in motivational theory and constructive alignment principles to scaffold comparative reasoning and perspective-taking rather than merely reward participation. The evaluation draws on 30 semi-structured interviews with students and instructors across the Czech Republic, Slovakia, and Poland. Findings suggest that faction identity and structured debate transformed abstract paradigms into applied analytical positions, increasing sustained engagement while preserving academic rigor. The study argues that theoretically grounded gamification can function as epistemic infrastructure in conceptually demanding courses.*

**Keywords:** *constructive alignment, gamification, higher education, sociology, theoretical reasoning*

**JEL Classification:** *I21, I23, Z13*

### 1. INTRODUCTION

University teaching increasingly operates in what might be described as an attention-constrained environment. Students encounter dense theoretical content while simultaneously embedded in digital ecosystems structured around feedback loops, visible progression, and competitive metrics. In higher education, this creates a persistent tension: how to sustain engagement without sacrificing conceptual rigor. The problem is particularly acute in theory-heavy introductory courses, where abstract paradigms must become analytically usable rather than merely examinable.

Gamification has emerged as a frequently proposed response to declining engagement. Defined as the use of game design elements in non-game contexts (Deterding et al., 2011), gamification has been widely studied in higher education. Meta-analyses indicate consistent positive effects on behavioral engagement, yet far more heterogeneous and design-dependent effects on learning outcomes (Bai et al., 2020; Sailer & Homner, 2020).

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Experimental evidence further suggests that increases in activity do not automatically translate into deeper conceptual understanding (Mekler et al., 2017), and poorly aligned reward structures may even undermine intrinsic motivation (Hanus & Fox, 2015; Dichev & Dicheva, 2017). Thus, the central issue is not whether gamification “works,” but under what conditions it supports epistemic development. Most empirical research remains concentrated in STEM and quantitatively oriented disciplines (Subhash & Cudney, 2018). Theory-intensive humanities and social science contexts—where learning involves perspective-taking, argumentation, and engagement with competing paradigms—remain comparatively underexplored. At the same time, current undergraduate cohorts are frequently described through generational narratives that assume alignment between digital media socialization and game-based structures, yet empirical grounding for such assumptions remains limited (Saxena & Mishra, 2021).

Broader cultural developments suggest that game logics increasingly shape contemporary social spheres beyond entertainment. In my earlier work on the “gaming sphere,” I argue that gaming constitutes a semi-autonomous cultural domain structured around competition, progression, and rule-bound performance (Klíma, 2022). These logics increasingly permeate public discourse and institutional practices. If game structures already shape how contemporary cohorts interpret competition, progress, and recognition, the question for higher education is not whether to engage with these logics, but how to do so without trivializing academic inquiry.

In this paper, I approach gamification not as entertainment, but as institutional design. If incentives structure behavior in markets, they also structure behavior in classrooms. The central question guiding this study is therefore: can competitive and identity-based mechanics be constructively aligned with the epistemic objectives of a conceptually intensive university course? To examine this, I designed and implemented a gamified introductory sociology course structured around competing theoretical factions, experience-point progression, and public leaderboards with positive-only grading effects. The design was explicitly grounded in motivational theory and constructive alignment principles, and deliberately avoided superficial “pointification” approaches criticized in the literature (Dichev & Dicheva, 2017).

The paper proceeds as follows. First, I review the literature on gamification in higher education, showing the distinction between engagement and learning outcomes and identifying a disciplinary gap in theory-heavy contexts. Second, I present the pedagogical rationale and structural design of the course. Third, I evaluate its implementation through qualitative interviews with students and instructors. Finally, I discuss implications for designing incentive-compatible learning environments in conceptually demanding university settings. The findings

suggest that when gamification is theoretically grounded and epistemically aligned, it may function not merely as a motivational overlay but as epistemic infrastructure. For institutions seeking to reconcile engagement with rigor, this distinction is critical.

## **2. LITERATURE REVIEW**

Gamification in higher education promises engagement, yet evidence for deeper learning remains contested. My review examines the conceptual foundations and empirical findings most relevant to theory-intensive courses, showing the persistent gap between behavioral activation and epistemic development. I then identify the disciplinary blind spots that motivate the present study.

### ***2.1 Gamification in Higher Education***

Gamification is commonly defined as the use of game design elements in non-game contexts (Deterding et al., 2011). This definition distinguishes gamification from game-based learning and serious games, where learning occurs through playing a complete game designed for educational purposes rather than through the addition of selected game elements to existing instructional activities (Krath et al., 2021; Landers, 2014). Systematic reviews repeatedly note that educational research often conflates these concepts, which complicates evidence synthesis and design guidance (Dichev & Dicheva, 2017; Krath et al., 2021). In higher education, gamification typically involves integrating elements such as points, badges, leaderboards, levels, quests, narrative framing, and structured feedback into conventional courses (Seaborn & Fels, 2015; Subhash & Cudney, 2018). However, gamification itself is not a pedagogical theory but a design strategy. Its educational effectiveness depends on the psychological and instructional mechanisms through which these elements influence learning behaviors (Landers, 2014). Self-Determination Theory (SDT) is among the most frequently applied frameworks to explain gamification effects. According to SDT, intrinsic motivation is supported when environments satisfy learners' needs for autonomy, competence, and relatedness (Ryan & Deci, 2000). Game elements such as meaningful choice, structured progression, feedback loops, and collaborative structures may support these needs. However, when rewards are perceived as controlling rather than competence-affirming, they may undermine intrinsic motivation (Deci et al., 1999). This concern is reflected in critiques of "pointification," where gamification is reduced to superficial reward systems without deeper pedagogical integration (Dichev & Dicheva, 2017).

Goal-setting theory offers a complementary explanation. Specific, challenging goals combined with feedback improve performance (Locke

& Latham, 2002). Gamified systems often operationalize this logic through levels, challenges, and visible progress indicators. Similarly, expectancy–value theory suggests that learners engage when they both expect success and perceive value in a task (Wigfield & Eccles, 2000). Narrative framing and visible progress may enhance perceived value, yet poorly aligned mechanics may reduce perceived academic seriousness if they conflict with disciplinary norms.

Meta-analytic and theoretical syntheses emphasize that gamification outcomes are contingent on design quality rather than the mere presence of game elements (Bai et al., 2020; Sailer & Homner, 2020). Experimental work isolating individual elements demonstrates that behavioral activity may increase without corresponding improvements in intrinsic motivation or deeper learning (Mekler et al., 2017). This distinction between activity and understanding is central to evaluating gamification in higher education.

## ***2.2 Engagement and Learning Outcomes in Higher Education***

Empirical research on gamification in higher education consistently reports positive effects on engagement-related indicators, yet evidence for improved learning outcomes is more heterogeneous and strongly moderated by design quality. Systematic reviews and meta-analyses provide a useful starting point for distinguishing these two dimensions (Bai et al., 2020; Sailer & Homner, 2020; Subhash & Cudney, 2018). Across university contexts, gamification reliably increases behavioral engagement. Studies report higher participation rates, increased time-on-task, greater completion of optional activities, and elevated platform interaction when game elements are introduced (Domínguez et al., 2013; Ding et al., 2017; Huang & Hew, 2018). Meta-analytic syntheses confirm small-to-moderate positive effects on motivational and behavioral indicators, though with considerable heterogeneity (Bai et al., 2020; Sailer & Homner, 2020).

However, engagement gains are not uniform across implementations. In some longitudinal classroom studies, initial motivational increases decline over the course of a semester, particularly in reward-heavy systems dominated by points and leaderboards (Hanus & Fox, 2015). This suggests that novelty effects and competitive dynamics may produce short-term activation without sustained motivational benefits. Many higher-education studies operationalize success through engagement proxies—clicks, posts, attendance, participation frequency—rather than through measures of conceptual understanding or transfer (Dichev & Dicheva, 2017). While increased participation can be pedagogically valuable, equating activity with learning risks overstating gamification’s educational impact.

Evidence for learning gains is more cautious but not absent. Meta-analyses report small-to-moderate positive effects on cognitive outcomes, with effect sizes highly dependent on implementation characteristics (Bai et al., 2020; Sailer & Homner, 2020). Stronger learning effects tend to occur when gamification is closely aligned with instructional objectives and when game elements directly support learning-relevant behaviors such as retrieval practice, structured problem-solving, or artifact production (Huang & Hew, 2018; Legaki et al., 2020).

Experimental research isolating individual game elements demonstrates that increases in performance quantity do not necessarily translate into improvements in intrinsic motivation or deeper conceptual understanding (Mekler et al., 2017). Similarly, some semester-long classroom interventions report lower final exam performance in gamified conditions when intrinsic motivation declines over time (Hanus & Fox, 2015). These findings reinforce the importance of theoretical alignment and instructional coherence. Disciplinary moderation further complicates interpretation. Empirical evidence is disproportionately concentrated in STEM and quantitatively oriented fields such as engineering, statistics, and computer science (Subhash & Cudney, 2018). Where subgroup analyses are conducted, learning effects vary by discipline, task type, and student characteristics (Legaki et al., 2020). This raises questions about the transferability of findings to theory-heavy humanities and social science contexts, where learning outcomes emphasize interpretation, argumentation, and epistemic reasoning rather than procedural problem-solving.

The literature suggests a consistent pattern: gamification in higher education is more reliably associated with increased engagement than with demonstrably improved deep learning. Learning gains appear most robust when game mechanics are explicitly designed to scaffold cognitively demanding behaviors rather than merely reward participation. This distinction between behavioral activation and epistemic development is critical for evaluating gamification in conceptually intensive university courses.

### ***2.3 Generation Z and Gamification in Higher Education***

Current undergraduate cohorts in many higher-education systems are predominantly members of Generation Z, commonly defined as individuals born from the mid-1990s onward (Dimock, 2019). This cohort is frequently characterized in educational discourse as digitally immersed, accustomed to interactive media environments, and responsive to visually structured feedback systems. Such descriptions have contributed to a pedagogical narrative suggesting that gamification is particularly well suited to Generation Z learners.

However, empirical research linking gamification effectiveness explicitly to generational cohort remains limited. While many post-2016 higher-education studies necessarily include Generation Z participants by age composition, few studies model generational identity as an independent analytical variable (Saxena & Mishra, 2021). Instead, generational assumptions often function implicitly, serving as contextual justification rather than empirically tested explanatory factors. Systematic reviews focusing specifically on Generation Z suggest that interactive, feedback-rich, and technology-enhanced learning environments may align with reported preferences for immediacy and visible progress (Saxena & Mishra, 2021; Antal-Berbecaru et al., 2023). Nevertheless, such findings primarily concern perceived engagement and satisfaction rather than demonstrated improvements in higher-order learning outcomes.

Broader motivational theories caution against equating familiarity with digital environments with increased academic persistence or conceptual depth. The assumption that students socialized in gamified digital ecosystems automatically respond positively to academic gamification remains under-theorized and insufficiently tested (Sailer & Homner, 2020). In particular, little research examines whether Generation Z students benefit differently from gamified designs in theory-intensive disciplines compared to applied or technical subjects. Thus, while generational discourse provides a compelling contextual rationale for exploring gamified pedagogies in contemporary university settings, robust evidence directly linking Generation Z identity to improved learning through gamification remains fragmented. This gap shows the importance of examining not only whether gamification increases engagement among current cohorts, but whether it supports durable epistemic development in conceptually demanding courses.

#### ***2.4 Gamification in Theory-Heavy Courses***

The majority of empirical research on gamification in higher education is concentrated in STEM and quantitatively oriented disciplines such as engineering, computer science, statistics, and business analytics (Subhash & Cudney, 2018; Bai et al., 2020). In these contexts, learning outcomes often involve procedural problem-solving, skill acquisition, or measurable performance on structured tasks, which align relatively well with challenge-based mechanics, incremental progression, and immediate feedback systems.

Theory-heavy humanities and social science courses typically pursue qualitatively different learning objectives. These include interpretation of texts, construction of arguments, epistemological reflection, perspective-taking, and engagement with competing theoretical paradigms. Such

outcomes are less easily captured by performance metrics and less directly aligned with point-based reward structures. Consequently, the transferability of gamification findings from STEM contexts to humanities settings remains uncertain.

Empirical work in humanities disciplines does exist but remains comparatively limited and often descriptive rather than experimental. For example, role-play and quest-based course designs in political science have been documented as “gameful” restructurings that emphasize identity, progression, and narrative framing (Hellström, 2023). These designs suggest that mechanics centered on role adoption and structured progression may align more closely with debate-oriented and interpretive learning goals than competitive point systems. Within sociology specifically, emerging classroom interventions have explored gamification not merely as a motivational device but as an object of critical reflection. For instance, action-research designs in sociology courses have used gamified activities to examine issues of consent, surveillance, and labor process theory, thereby integrating gamification into the epistemic content of the course itself (Folse & Poole, 2024). Such approaches show the potential for gamification to support critical awareness rather than mere behavioral compliance. Across reviews, scholars caution that “pointification” is particularly problematic in conceptually intensive disciplines, where learning is interpretive, cumulative, and often slow (Dichev & Dicheva, 2017; Krath et al., 2021). Superficial reward systems risk trivializing academic work or shifting attention from argumentative depth to performance indicators. At the same time, design frameworks emphasizing narrative coherence, meaningful choice, collaboration, and identity formation suggest a more promising alignment with humanities learning goals (Nicholson, 2014). The literature indicates that while gamification has demonstrated engagement benefits across disciplines, rigorous causal evidence in theory-heavy humanities contexts remains limited. In particular, few studies examine whether gamified course structures enhance epistemological understanding, argumentative quality, or the ability to navigate competing theoretical frameworks—core objectives in introductory sociology. This disciplinary gap provides a strong rationale for examining theoretically aligned gamification in conceptually intensive university courses.

The cumulative evidence suggests that gamification in higher education is neither inherently effective nor inherently problematic; its impact depends on theoretical grounding, alignment with learning objectives, and sensitivity to disciplinary context. Across meta-analyses and systematic reviews, a consistent recommendation is to begin with clearly articulated learning outcomes, identify the cognitive and behavioral processes that mediate those outcomes, and only then select game elements capable of

supporting them (Bai et al., 2020; Krath et al., 2021). Gamification should thus follow pedagogy rather than precede it. Alignment is particularly critical in theory-intensive disciplines. If learning goals emphasize interpretation, argumentation, and epistemological reasoning, mechanics must scaffold those processes directly—through structured debate, role identity, narrative coherence, or iterative feedback—rather than through abstract point accumulation (Nicholson, 2014). Designs dominated by points–badges–leaderboards risk shifting attention toward performance visibility and competition without necessarily strengthening conceptual understanding (Dichev & Dicheva, 2017). Ethical considerations further complicate implementation. Critical scholarship has argued that gamification may import performance logics associated with competition, surveillance, and metric-driven evaluation into educational settings (Tulloch, 2018). In classroom contexts, excessive social comparison can undermine intrinsic motivation, particularly when rewards are perceived as controlling or when performance is publicly ranked (Hanus & Fox, 2015). Transparent communication about rules, assessment criteria, and data visibility, therefore becomes part of responsible instructional design. The literature indicates that meaningful gamification requires theoretical justification, constructive alignment, and ethical reflexivity. These principles are especially relevant when designing gamified structures for conceptually demanding heavy-theory courses, where the aim is not merely increased participation but sustained engagement with competing theoretical frameworks. The following sections present a course design developed explicitly in response to these considerations.

### **3. METHODOLOGY**

This study follows a design-based research approach. The gamified course model was developed iteratively based on existing literature on gamification in higher education, with particular attention to the distinction between engagement and learning outcomes, motivational theory, and constructive alignment principles (Bai et al., 2020; Krath et al., 2021; Sailer & Homner, 2020). Rather than adopting gamification as a generic overlay, the course was intentionally designed to align game mechanics with specific epistemic objectives of introductory sociology, including comparative theoretical reasoning, perspective-taking, and analytical application. The structural elements of the course—faction identity, narrative framing, experience points (XP), level progression, and public leaderboards with positive-only grading effects—were selected based on their hypothesized capacity to scaffold sustained engagement while supporting theory-centered learning behaviors. The implementation was refined through classroom testing and instructor feedback prior to formal evaluation.

The evaluation relied on qualitative semi-structured interviews conducted after course completion. In total, 30 interviews were collected across three Central European contexts (Czech Republic, Slovakia, and Poland). The sample included 20 university students who participated in the gamified course and 10 instructors (high school and university level) who implemented or observed the model in their own institutional settings. Interviews lasted approximately 30–50 minutes and were conducted either online or in person at the respective institutions after the conclusion of the course. Interviews focused on participants' perceptions of engagement, preparation patterns, theoretical depth, classroom dynamics, and perceived academic rigor. Data were analyzed thematically with attention to recurring patterns across institutional contexts and respondent groups. Given the exploratory nature of the study, the evaluation emphasizes interpretive coherence and cross-perspective convergence rather than causal inference.

#### **4. DESIGNING A GAMIFIED CLASS**

If gamification is to support deep learning rather than merely increase activity, its mechanics must be constructively aligned with disciplinary objectives. This section presents the design of a gamified introductory sociology course built around competing theoretical factions, structured debate, and positive-only competitive incentives. The focus is not on entertainment, but on organizing epistemic engagement.

##### ***4.1 Pedagogical Objectives and Design Rationale***

The course redesign was implemented in an introductory undergraduate sociology course focused on foundational theoretical paradigms, including structural functionalism, interpretative sociology, critical theory, and contemporary approaches to modernity. The primary learning objectives were not procedural skill acquisition but the development of conceptual differentiation, comparative theoretical reasoning, and the ability to interpret social phenomena through competing sociological lenses. Students were expected to distinguish paradigms, articulate their underlying assumptions, and apply them analytically to empirical or contemporary cases. Given the literature reviewed above, the decision to employ gamification was not motivated by the assumption that game elements inherently increase learning. Rather, the redesign was guided by two interrelated concerns: (1) increasing sustained engagement with theoretically dense material, and (2) scaffolding epistemic processes central to sociological reasoning. As previous research indicates, engagement gains alone do not guarantee deeper understanding (Bai et al., 2020; Sailer & Homner, 2020). Therefore, the design explicitly aimed to connect mechanics to learning-relevant behaviors rather than to reward participation as an end in itself.

The design was informed by three theoretical principles. First, drawing on Self-Determination Theory (Ryan & Deci, 2000), the course structure sought to support autonomy through meaningful choice (e.g., faction affiliation and optional tasks), competence through structured progression and feedback, and relatedness through collaborative activities and debate formats. Second, in line with constructive alignment principles emphasized in gamification research (Krath et al., 2021), learning outcomes were specified prior to the selection of mechanics. Only game elements that plausibly supported targeted epistemic behaviors—such as comparative argumentation, theoretical defense, and interpretive application—were incorporated. Third, the design deliberately avoided “pointification” approaches dominated by points–badges–leaderboards, which have been associated with short-term activation and potential motivational decline (Dichev & Dicheva, 2017; Hanus & Fox, 2015).

The redesign did not replace formal academic assessment with game rewards. Instead, gamified elements were positioned as structural supports for engagement and perspective-taking, while summative evaluation remained anchored in written analytical assignments and examination responses. This distinction was intended to maintain academic seriousness while leveraging selected game mechanics to organize interaction and progression.

#### ***4.2 Structural Design of the Gamified Course***

The gamified redesign was structured around a semester-long narrative framework in which students participated as members of competing theoretical factions. Each faction represented a major sociological paradigm (e.g., structural functionalism, conflict theory, interpretative sociology, and critical/post-structural approaches). Rather than treating paradigms as abstract intellectual categories, they were operationalized as epistemic identities through which students engaged weekly topics. This structure aimed to support perspective-taking and comparative reasoning—core learning objectives in introductory sociology.

##### ***4.2.1 Narrative and Faction Structure***

The semester was framed as an unfolding “theoretical campaign” in which paradigms competed to interpret contemporary social issues. Students selected or were assigned to factions at the beginning of the course and worked within teams aligned with their paradigm. Weekly sessions were organized as thematic “missions,” requiring factions to apply their theoretical lens to specific empirical or conceptual problems.

This design sought to transform abstract theoretical differentiation into structured epistemic positioning. By repeatedly defending and applying a paradigm across diverse topics, students were encouraged to internalize its

assumptions, vocabulary, and analytical logic. Narrative framing functioned not as decorative storytelling, but as an organizing device to create coherence across weekly sessions and to support identity-based engagement.

To scaffold progression, the course incorporated an experience point (XP) system and level structure. Students earned XP through faction-based activities such as structured debates, analytical exercises, mission completion, and optional bonus tasks. XP accumulation led to level advancement, visible to the class through public leaderboards. Public leaderboards were intentionally used to introduce competitive dynamics between factions. The rationale was twofold. First, competition was expected to increase behavioral engagement and preparation, particularly in debate-oriented sessions. Second, faction-level competition reduced individual exposure by framing performance at the team level rather than solely at the individual level.

Importantly, XP influenced formal course grading only positively. Accumulated XP translated into bonus points added to summative assessment outcomes, but no student's grade could be reduced due to gamified performance. This "positive-only" influence was designed to mitigate motivational risk and avoid punitive consequences of competitive variance.

Faction members operated in teams, collaborating to prepare arguments, defend positions, and respond to challenges from competing paradigms. Team-based mechanics were intended to support relatedness and shared responsibility while distributing cognitive load in theory-intensive discussions. Structured debate formats required factions not only to advocate their assigned paradigm but also to critique others, reinforcing comparative analysis. The repeated requirement to defend a theoretical position—even when students did not personally endorse it—was designed to strengthen epistemological awareness. By inhabiting a paradigm, students engaged in applied theoretical reasoning rather than passive content consumption.

Each mechanic was selected to support specific learning behaviors. Faction identity supported perspective-taking and paradigm differentiation. XP progression and level advancement incentivized preparation and sustained participation. Debate-based missions required theoretical application rather than recall. Optional bonus tasks encouraged deeper reading engagement. While competition and public visibility were deliberately incorporated, the primary evaluative criteria remained anchored in written analytical work and examination performance.

Gamified structures were therefore designed as engagement and epistemic scaffolds rather than substitutes for academic assessment.

## **5. EVALUATION OF POST-COURSE INTERVIEWS**

A dominant theme across student interviews was the shift from passive reception of theory toward active epistemic positioning. Students repeatedly described moving from memorizing theoretical concepts for examination purposes to “thinking from within” a paradigm. The faction system required participants to defend and apply a theoretical framework consistently across topics, transforming paradigms from historical content into analytical tools. Several students reported that theory moved from “short-term memorization” to what they described as a more durable “analytical toolkit.” Teachers independently observed similar changes, describing improvements in comparative reasoning and reductions in opinion-based argumentation. Rather than expressing personal views, students increasingly grounded claims in paradigm-specific assumptions, demonstrating clearer differentiation between theoretical approaches.

The faction structure also appeared to function as a mechanism of psychological safety. Both students and teachers noted that speaking as a representative of a theoretical perspective reduced fear of personal judgment. The distribution of responsibility within teams lowered individual performance pressure while increasing participation, particularly among introverted and international students. The role-based format reframed classroom debate as structured epistemic performance rather than personal confrontation. Teachers emphasized that this shift increased the willingness of students to engage in critique and counter-argument, contributing to more sophisticated theoretical exchanges.

Competitive elements—XP accumulation, levels, and public leaderboards—were consistently described as energizing rather than punitive. Students reported that visible progress and faction ranking increased preparation and sustained attention across the semester. Importantly, the positive-only grading policy—where XP could add bonus points but never reduce grades—was repeatedly identified as a crucial design safeguard. Teachers emphasized that the absence of negative consequences mitigated toxic competition and preserved intrinsic motivation. Where morale imbalances emerged, instructors introduced catch-up mechanics, suggesting that competition required active moderation but did not inherently undermine classroom climate.

Interview data further indicate that reading and preparation behaviors shifted qualitatively. Students described engaging with assigned texts as “argument gathering” or “intelligence preparation” for faction debates. Teachers confirmed that students more frequently referenced primary texts

and theoretical distinctions during discussions. This suggests that the competitive and identity-based mechanics scaffolded behaviors aligned with deeper engagement, rather than merely increasing superficial activity. At the same time, participants consistently rejected the notion that gamification reduced academic seriousness. On the contrary, several students described the course as more intellectually demanding due to the necessity of defending a coherent theoretical stance in dynamic exchanges.

Despite predominantly positive evaluations, limitations were also identified. Some students exhibited strong faction attachment, raising concerns about temporary theoretical rigidity. Teachers addressed this through debriefing phases and structured reflection, encouraging meta-level comparison across paradigms. Logistical demands emerged as the most significant constraint. XP tracking, leaderboard updates, and rule management required substantial administrative effort, particularly in large cohorts. Several instructors emphasized that the model is front-loaded in design complexity and requires reliable implementation to maintain legitimacy. Across institutional contexts—including large university lectures and smaller seminar settings—participants reported similar patterns of increased participation, improved theoretical differentiation, and enhanced social cohesion. While these findings are based on qualitative evaluation rather than controlled experimental comparison, the convergence between student and teacher perspectives strengthens the credibility of observed effects.

My evaluation suggests that the gamified structure functioned not merely as a motivational overlay but as epistemic infrastructure. Faction identity scaffolded perspective-taking, competitive progression sustained engagement, and debate-centered mechanics operationalized theoretical comparison. The positive-only reward system and team-based structure appear to have mitigated common risks associated with competitive gamification. The principal limitation of the model lies in logistical complexity rather than pedagogical incoherence. These findings provide preliminary support for theoretically aligned gamification in conceptually intensive, heavy-theory-based courses.

## **6. CONCLUSION**

I showed in this paper the design and evaluation of a gamified introductory sociology course structured around competing theoretical factions, narrative framing, and positive-only competitive mechanics. Building on existing research that distinguishes engagement effects from deeper learning outcomes, the study addressed a disciplinary gap in the literature: the limited evidence on gamification in theory-heavy humanities contexts.

The findings suggest that when gamification is constructively aligned with epistemic objectives, it can function as more than a motivational overlay. In this case, faction identity and structured debate transformed abstract paradigms into lived analytical positions. Students moved from memorizing theoretical definitions to inhabiting and defending coherent theoretical frameworks. Interview data indicate improved comparative reasoning, stronger differentiation between paradigms, and increased willingness to engage in structured argumentation. Competitive elements—particularly XP and public leaderboards—contributed to sustained engagement, yet the positive-only grading structure mitigated risks of punitive comparison. The design did not replace formal academic assessment. Instead, gamified mechanics scaffolded behaviors aligned with disciplinary goals: perspective-taking, argument construction, and theoretical application. Thus, the course model responds to concerns in the literature that gamification often increases activity without strengthening understanding. In this context, engagement and epistemic development appeared mutually reinforcing rather than divergent.

There are some limitations. The evaluation is qualitative and context-bound, and the model requires substantial logistical investment to maintain transparency and credibility. Future research should incorporate mixed-method designs and comparative analyses to examine whether similar epistemic effects are observable across institutions and cohort compositions.

I aim to contribute to the emerging literature on theoretically aligned gamification in higher education. It demonstrates that in conceptually intensive courses, game mechanics can be designed as epistemic infrastructure rather than superficial reward systems. When grounded in pedagogical theory, constructively aligned with learning outcomes, and implemented with ethical safeguards, gamification may support not only engagement but durable engagement with theory itself.

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# EDUCATION OF GENERATION Z AND ITS INTEGRATION INTO THE LABOUR MARKET IN THE EUROPEAN UNION: IMPLICATIONS FOR THE TOURISM SECTOR

*Simona KOPUNCOVÁ<sup>1</sup>*

**Abstract:** *The paper analyses the relationship between education, the integration of Generation Z into the labour market, and workforce retention in the European Union, with particular emphasis on the tourism sector. Generation Z enters the labour market with distinct values and expectations, posing challenges to traditional models of education and employment. The aim of the paper is to examine selected indicators related to the transition of young people from education to employment. The analysis is based on secondary data from Eurostat covering the period 2020–2024 and applies methods of descriptive statistics and time-series analysis. Particular attention is devoted to youth employment rates, the share of young people classified as NEET, and early school leaving. The findings indicate a moderate improvement in integration indicators, while structural risks related to skills mismatch and employment instability persist. Given the above-average representation of young workers in tourism, aligning education with labour market requirements is crucial for ensuring workforce stability and sustainability in this sector.*

**Key words:** education, generation z, labour market, neet, tourism

**JEL klasifikácia:** I21, J21, J24, J64, L83

## 1. INTRODUCTION

Demographic and generational changes in recent years have significantly influenced the functioning of the labour market, educational requirements, and the integration of young people into the workplace. Generation Z, which is gradually replacing older generations in the labour market, enters employment with distinct value orientations, expectations, and approaches to work compared to previous generations (Lazaridis, 2025). These specific characteristics are reflected not only in their relationships with employers but also in their attitudes towards education, professional development, and long-term job stability.

Education plays a crucial role in this process, as it represents the primary mechanism preparing young people for entry into working life. However, academic literature points out that traditional forms of vocational education often fail to respond adequately to the evolving needs of young

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people and the dynamics of the contemporary labour market (Weaver, 2024). Insufficient linkage between theoretical knowledge and practical skills may weaken motivation, reduce preparedness for the workplace, and create difficulties during the transition from education to employment (DiMattio & Hudacek, 2020).

The importance of these issues is particularly pronounced in service sectors, which are characterised by a high dependence on human labour and increased employee turnover. According to Eurostat (2023), tourism is among the sectors with an above-average representation of young workers. In 2023, individuals aged 15–24 accounted for approximately 11% of total employment in tourism industries, compared to only 9% in the non-financial business economy overall. In the accommodation sub-sector, the share of young workers reached 12%, and in some EU countries, such as Denmark, Ireland, the Netherlands and Sweden, it exceeded 23–28%. Tourism thus frequently serves as young people's first point of contact with the labour market. At the same time, it is characterised by specific operational features, including seasonality, irregular working hours and a higher proportion of temporary contracts, all of which may increase the risk of employment instability (Kim, 2008; Robinson et al., 2016).

Consequently, academic literature increasingly highlights the mismatch between educational processes and labour market requirements, manifested in insufficiently developed skills, unmet expectations, and difficulties in adapting to workplace realities (Indrayani, 2025; El Hajal & Losekoot, 2025). This mismatch may lead to a higher risk of labour market inactivity, early school leaving, or repeated entries and exits from employment.

For these reasons, greater attention should be paid to the relationship between education, the integration of Generation Z into the labour market, and workforce retention, particularly in sectors with a high share of young employees. Understanding these interconnections provides an important basis for developing systemic and organisational approaches that foster greater workforce stability and more effective utilisation of young people's potential.

## **2. LITERATURE REVIEW**

In the contemporary labour market, young people's willingness to actively engage in educational and work processes plays a crucial role not only in terms of immediate employability but also with regard to the long-term stability of the workforce. This aspect is particularly significant in service sectors, including tourism, which are characterised by high labour intensity, frequent customer interaction and elevated employee turnover (Kim, 2008; Robinson et al., 2016). Maintaining the motivation and

engagement of Generation Z therefore represents a persistent challenge for both educational institutions and employers.

Traditional approaches to vocational education, often based on standardised curricula and passive forms of instruction, appear insufficient in addressing the needs of the heterogeneous group of Generation Z learners, who differ in abilities, expectations, learning styles and value orientations (Weaver, 2024). Research suggests that such approaches may result in the formal fulfilment of educational requirements but rarely foster deeper intrinsic motivation or genuine preparedness for real working environments (DiMattio & Hudacek, 2020). Generation Z tends to prefer interactive and experiential learning formats, stronger links between theory and practice, the use of digital technologies and flexibility within educational processes. They typically expect rapid feedback, visually and multimedia-oriented content, and clear practical relevance of acquired knowledge. In the workplace, they favour clearly defined expectations, opportunities for personal development, mentoring support and work–life balance (Lazaridis, 2025; Engström et al., 2025). Moreover, they place strong emphasis on meaningful work, personal well-being and the quality of the working environment, perceiving financial remuneration within the broader context of organisational culture and value alignment (Trifan & Pantea, 2024; Krishna & Agrawal, 2025).

A major issue identified in the literature is the mismatch between educational outcomes and labour market requirements, often referred to as skill mismatch and expectation gap (Indrayani, 2025; El Hajal & Losekoot, 2025). Young people of Generation Z frequently enter the labour market with idealised perceptions of working conditions, which may conflict with the demanding operational realities of sectors such as tourism, including irregular working hours, seasonality and limited career progression opportunities (Sin et al., 2022). This discrepancy can result in rapid disillusionment and early job departure, thereby negatively affecting workforce stability.

Motivation and engagement among young people should therefore not be understood as static or universal phenomena. Rather, they represent dynamic processes shaped by the interaction of individual expectations, educational strategies, managerial approaches and institutional conditions. Academic sources emphasise the importance of student- and employee-centred approaches, adaptability in educational design and closer integration of theory with practice, particularly in sectors with a high proportion of young workers (Lazaridis, 2025; Engström et al., 2025).

From a practical perspective, these challenges are particularly evident in sectors that serve as an entry point to the labour market for young people. Tourism is among the industries with an above-average share of young workers: in 2023, individuals aged 15–24 accounted for approximately

11% of employment in tourism industries, compared to around 9% in the non-financial business economy overall. In the accommodation sub-sector, the proportion of young workers reached 12%, and in certain countries (e.g. Denmark, Ireland and the Netherlands) it exceeded 27–28% (Eurostat, 2023). At the same time, the sector provides employment opportunities for individuals with lower levels of formal education; in accommodation services, approximately 25% of employees had a lower educational attainment (Eurostat, 2023). This further increases the importance of effective educational and adaptation mechanisms. Insufficient alignment between education and workplace realities in this sector may contribute to a higher risk of youth unemployment, inclusion in the NEET category and early school leaving.

The issue addressed in this paper therefore lies not in questioning whether education and skills development influence workforce retention, but in understanding how current educational systems and institutional frameworks respond to the specific characteristics of Generation Z and the needs of service industries. Addressing this issue requires moving beyond general claims about educational effectiveness towards an analytical perspective that takes into account contextual conditions, sectoral specificities and practical constraints. Such an approach enables a deeper understanding of young people's motivation, engagement and employment stability, and provides a foundation for analysing empirical trends and formulating recommendations aimed at retaining Generation Z within the workforce.

### **3. AIM AND METHODOLOGY**

The aim of this paper is to analyse the development of selected labour market and education indicators concerning young people in the European Union during the period 2020–2024 and to interpret their significance in relation to workforce retention in the tourism sector. The analysis focuses on the age groups 18–24 and 20–29, which broadly correspond to Generation Z. In this study, Generation Z is understood as an interpretative framework that helps explain identified trends in the transition from education to employment rather than as a strictly defined statistical category.

The research problem lies in identifying the mismatch between young people's educational processes and labour market requirements, as reflected in selected indicators, namely youth employment rates, the proportion of young people in the NEET category and the share of individuals leaving education and training early. This mismatch represents a significant risk for employment stability and workforce retention, particularly in service sectors with a high proportion of young employees and elevated turnover rates, such as tourism.

Methodologically, the paper is designed as a theoretical-analytical study based on the processing of secondary statistical data. The primary data source consists of harmonised indicators from the Eurostat database, ensuring comparability and methodological consistency at the EU level. The methods employed include descriptive statistics, time series analysis and comparative analysis of selected indicators over the observed period.

The paper does not aim to test causal relationships or formulate statistical hypotheses. Instead, it focuses on identifying developmental trends and interpreting them in the context of education, generational change and workforce retention in the tourism sector. A limitation of the study lies in the use of aggregated secondary data, which does not allow for the analysis of individual career trajectories. Nevertheless, the approach provides a relevant analytical framework for understanding broader trends affecting the integration of young people into the labour market at the European level.

## **4. RESULTS**

The following section presents the results of the analysis of selected labour market and education indicators concerning young people in the European Union over the period 2020–2024. The focus is placed on indicators closely related to Generation Z's transition from the education system to the labour market and representing significant factors influencing workforce retention, particularly in service sectors, including tourism. The results are presented through tables and figures and are complemented by an interpretation of the identified trends in the context of the relevant academic literature.

### **4.1 Employment rate by age groups**

Table 1 and Figure 1 illustrate the development of the employment rate in the age groups 20–29 and 55–64 in the European Union between 2020 and 2024. In both groups, an upward trend in employment can be observed, indicating a gradual recovery of the labour market following the pandemic crisis.

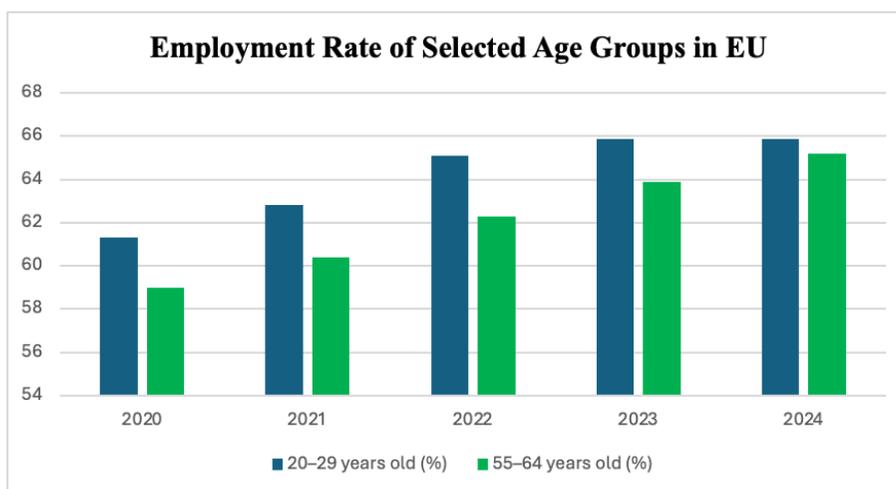
The age group 20–29 was selected as representative of young people transitioning from education to employment, while the 55–64 age group represents older workers approaching retirement. Comparing these two groups makes it possible to analyse generational differences in labour market participation and to examine whether employment rates are converging between the entering and the exiting segments of the workforce.

In the 20–29 age group, the employment rate increased from 61.3% in 2020 to 65.9% in 2024. A similar trend was observed among individuals aged 55–64, where the employment rate rose from 59.0% to 65.2% over the same period. The comparison of these developments indicates a gradual convergence in employment rates between younger and older workers, suggesting a narrowing gap in labour market participation across generations.

**Table 1 Employment Rate of Selected Age Groups in the European Union by Year (2020–2024)**

	Age 20–29 years old (%)	Age 55–64 years old (%)
2020	61,3	59
2021	62,8	60,4
2022	65,1	62,3
2023	65,9	63,9
2024	65,9	65,2

**Source:** Eurostat



**Figure 1 Employment Rate of Selected Age Groups in the European Union by Year (2020–2024)**

**Source:** Eurostat

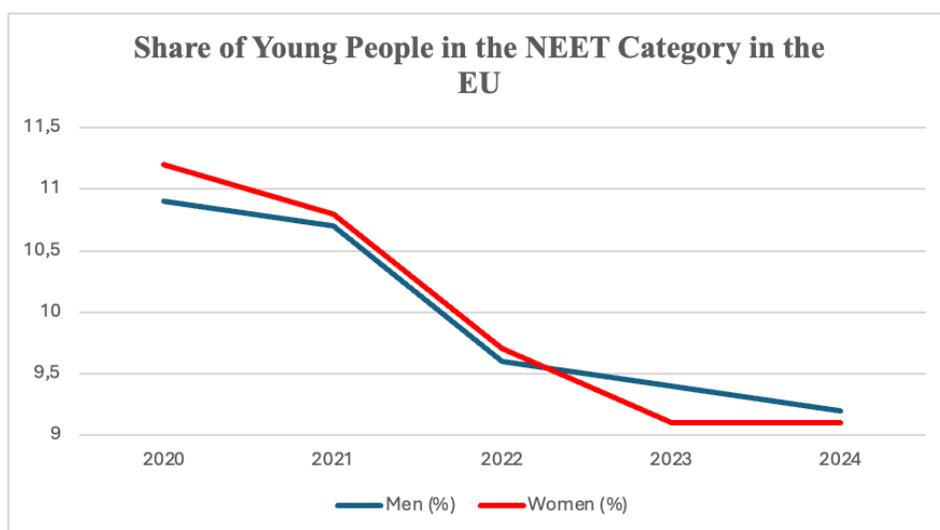
These findings correspond with the academic literature highlighting the changing generational structure of the labour force and the need to adapt education and employment policies to different age groups (Lazaridis, 2025). From the perspective of Generation Z, the observed trend represents a positive signal of improving employability. However, the literature also cautions that an increase in employment rates does not

automatically imply stability of employment relationships, particularly in sectors characterised by high turnover, such as tourism (Kim, 2008; Robinson et al., 2016).

#### 4.2 Share of Young People in the NEET Category by Gender

Figure 2 presents the results of the analysis of the NEET indicator, showing a declining trend in the share of young people who are neither in employment nor in education or training. Over the period 2020–2024, the value of this indicator gradually decreased for both men and women.

The data indicate that the NEET rate among young men declined from 10.9% in 2020 to 9.2% in 2024, while among young women it decreased from 11.2% to 9.1%. This development reflects not only an improvement in the integration of young people into the education system or labour market, but also a reduction in gender disparities, as the values for men and women converged considerably in the final years of the analysed period.



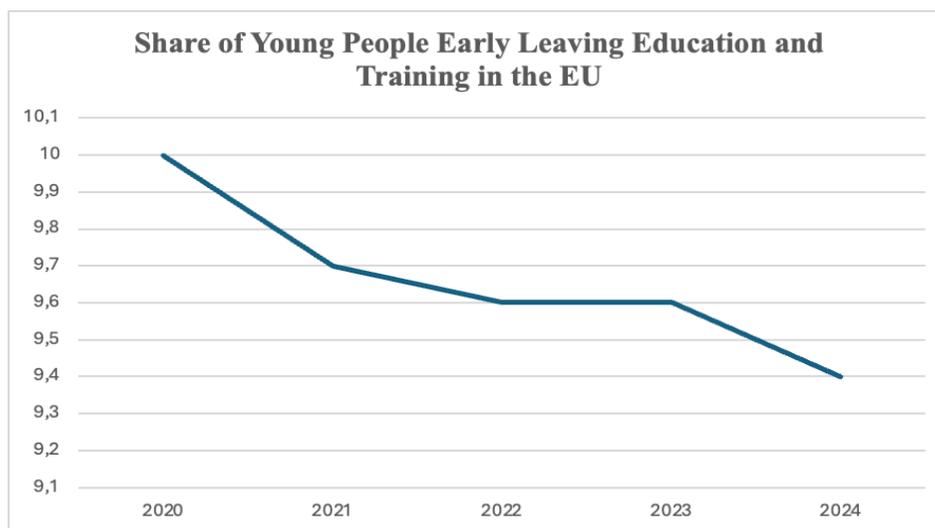
**Figure 2 Share of Young People NEET in the European Union by Gender and Year (2020–2024)**

**Source:** Eurostat

#### 4.3 Early Leaving from Education and Training (Aged 18–24)

Figure 3 illustrates the development of the share of individuals aged 18–24 who left education and training early in the European Union between 2020 and 2024. The data indicate a slight downward trend in this indicator, decreasing from 10.0% in 2020 to 9.4% in 2024.

No significant year-on-year fluctuations are observed during the analysed period, suggesting a relatively stable character of this phenomenon at the level of the European Union.



**Figure 3 Share of Persons Aged 18–24 Early Leaving Education and Training in the EU by Year (in %)**

Source: Eurostat

The gradual pace of change suggests that early leaving from education and training represents a long-term and structural problem that cannot be addressed through isolated or short-term measures. The academic literature emphasises that even a slight reduction in this indicator may have a significant impact on the employability of young people, as early school leaving is associated with an increased risk of unemployment and entry into the NEET category (Sin et al., 2022; Indrayani, 2025).

## 5. DISCUSSION

The results of the analysis of selected labour market and education indicators at the level of the European Union point to a gradual improvement in the employment situation of Generation Z in the period 2020–2024. The increase in the employment rate among young people aged 20–29 suggests an improving capacity of young individuals to enter the labour market following the pandemic crisis. From the perspective of Generation Z, this trend may be interpreted as a positive signal of growing employability, in line with the findings of Lazaridis (2025) regarding the

gradual adaptation of young workers to changing labour market conditions.

At the same time, the results indicate that an increase in employment does not automatically imply stability of employment relationships, particularly in sectors characterised by high levels of turnover and seasonality. According to Eurostat data, tourism is among the sectors with an above-average representation of young workers, predominantly from Generation Z. The seasonal nature of work, a higher share of temporary contracts and more frequent entries to and exits from the labour market increase the sensitivity of this sector to developments in the analysed indicators. These specific features confirm the conclusions of Kim (2008) and Robinson et al. (2016), who argue that turnover in tourism results from a combination of working conditions, organisational factors and employee expectations.

The declining trend in the proportion of young people classified as NEET during the analysed period may be interpreted as a positive development in terms of integration into education or employment. Nevertheless, the literature highlights that some young people may remain in short-term or unstable forms of employment typical of the tourism sector, which can lead to repeated transitions between employment and inactivity (Sin et al., 2022). The NEET indicator therefore remains an important measure of the persistent mismatch between education and labour market requirements, often referred to as the “skill and expectation gap” (Indrayani, 2025; El Hajal & Losekoot, 2025).

The development of the proportion of early leavers from education and training among those aged 18–24 shows slight improvement, yet also indicates the relative stability of this phenomenon at the EU level.

The discussion of the findings also confirms the importance of the value-based and psychological characteristics of Generation Z identified in the literature review. Generation Z places strong emphasis on work–life balance, personal well-being, meaningful work and the quality of the working environment, while perceiving financial remuneration within the broader context of organisational culture and value alignment (Trifan & Pantea, 2024; Krishna & Agrawal, 2025). In the tourism sector, these preferences increase the importance of transformational and human-oriented leadership styles, mentoring programmes and adaptation mechanisms that promote psychological safety among young employees (Stor, 2022; Poór et al., 2025; Lazaridis, 2025).

Overall, the analysis indicates gradual improvement in selected indicators of young people’s labour market integration in the European Union, particularly in terms of rising employment rates and a moderate decline in NEET rates and early school leaving. However, the relative stability of these indicators and the slow pace of change suggest that the transition of Generation Z from education to employment remains a sensitive process

influenced by the quality of educational preparation and the degree of alignment between acquired skills and labour market demands (Indrayani, 2025; El Hajal & Losekoot, 2025).

Although the analysed indicators suggest improved integration of young people into the labour market (higher employment and lower NEET rates), these changes remain gradual, and early school leaving remains relatively stable. This supports the argument in the literature that quantitative improvements do not necessarily translate into qualitative retention of the workforce, particularly in sectors with higher turnover and temporary contracts such as tourism (Kim, 2008; Robinson et al., 2016; Sin et al., 2022).

In the context of the tourism sector, characterised by an above-average share of young workers and higher turnover (Eurostat, 2023; Kim, 2008; Robinson et al., 2016), these findings may be interpreted as an indication of the need for systematic alignment between education and practical labour market requirements. The literature further suggests that a mismatch between the expectations of Generation Z and the realities of working conditions may lead to rapid disillusionment and increased turnover (Sin & Law, 2022; Lazaridis, 2025). The results therefore underline the importance of adaptation mechanisms, mentoring and the development of both practical and soft skills as factors contributing to more stable integration of young workers into the service sector (Engström et al., 2025; Aina & Ezeuduji, 2021).

## **6. CONCLUSION**

The aim of the paper was to analyse the relationship between education, the integration of Generation Z into the labour market, and workforce retention, with a particular focus on the service sector, especially tourism. By linking theoretical foundations with an analysis of selected labour market indicators at the level of the European Union, the paper contributes to a deeper understanding of the factors influencing the stability of the young workforce in the context of generational change.

The results indicate a gradual improvement in the integration of young people into the labour market in the period 2020–2024, reflected in the increase in the employment rate of the 20–29 age group and a decline in the proportion of young people in the NEET category. At the same time, Eurostat data (2023) confirm that tourism is among the sectors with an above-average share of young workers: in 2023, persons aged 15–24 accounted for approximately 11% of employment in tourism industries, compared with around 9% in the non-financial business economy overall. In the accommodation sub-sector, the share of young workers reached

12%, while in some countries (e.g. Denmark, Ireland and the Netherlands) it exceeded 27–28% (Eurostat, 2023).

These data confirm that tourism represents a significant entry point for young people into the labour market; however, it is also characterised by seasonality, a higher proportion of temporary contracts and increased staff turnover (Kim, 2008; Robinson et al., 2016; Sin et al., 2022). Improvements in quantitative employment indicators therefore do not automatically translate into long-term employment stability.

The analysis of early school leaving also points to the persistent structural nature of this phenomenon. Although slight improvement can be observed, the pace of change remains limited, supporting conclusions regarding the continuing mismatch between educational outcomes and labour market requirements, referred to as the skill mismatch and expectation gap (Indrayani, 2025; El Hajal & Losekoot, 2025). This mismatch is particularly significant in tourism, where employment requires a combination of professional and soft skills, adaptability, and the ability to cope with demanding operational conditions (Weaver, 2024; Sin & Law, 2022).

From the perspective of generational specifics, the literature emphasises that Generation Z places strong importance on meaningful work, well-being, work–life balance and opportunities for personal development (Trifan & Pantea, 2024; Krishna & Agrawal, 2025; Lazaridis, 2025). In a sector where a substantial proportion of employees are young and where approximately one quarter of workers in the accommodation sub-sector have lower levels of formal education (Eurostat, 2023), the importance of high-quality educational and adaptation mechanisms becomes even more pronounced.

In conclusion, the stability of Generation Z within the tourism workforce is conditioned not only by favourable macroeconomic trends, but above all by the quality of alignment between education and labour market demands and by organisations' ability to respond to the generational characteristics of young employees. Education focused on the development of practical and soft skills, combined with systematic support during the adaptation phase, represents a key prerequisite for the long-term sustainability of the workforce in this sector (Engström et al., 2025; Indrayani, 2025).

### ***Acknowledgements***

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## **OPTIONS TO ENHANCE THE ECONOMIC GROWTH OF SLOVAK ECONOMY WITHIN THE DIGITAL ECONOMY DEVELOPMENT - IMPACT ON EDUCATION, TRAINING AND EMPLOYMENT**

*Marcel Kordoš*<sup>1</sup>

**Abstract:** *The digital economy is a contemporary economic system that has emerged as a result of the rapid development of information and communication technologies (ICT) and their integration into all areas of the economy. The objective of this study is to identify current trends in employee training in the context of digital transformation, assess the state of digitization in Slovakia, and identify barriers that hinder its development focused on perspectives and recommendations that can contribute to the more effective use of digital technologies in businesses and public administration. To accomplish this goal, methods such as analysis, comparison, synthesis and logical deduction are to be used. Subsequently the analysis will lead to synthesis and prognosis by means of abstraction method eliminating the less important factors to set general statements and opinions. Data and for the analysis are withdrawn from the respected and reliable institutions such as EUROSTAT, Ministry of Economy of Slovak Republic, Slovak Statistical Office, and OECD have been used. The outlook for Slovakia is favorable, contingent upon the effective utilization of available European funds, the promotion of innovation, and the establishment of an environment that will encourage both businesses and the public sector to undergo digital transformation. The cooperation between the state, academia, and the private sector will be a pivotal factor in Slovakia's transition from below the EU average to the group of digitally advanced countries.*

**Key words:** *digital technologies, digital economy, competition policy promotion enhancement, education system changes, employment policy challenges*

**JEL Classification:** *I28, F63, O14*

### **1. INTRODUCTION**

The advent of digitization and the subsequent evolution of the digital economy represent some of the most consequential developments of our era, profoundly reshaping the economic landscape, the business environment, and the fabric of daily life in society. In recent decades, digital technologies have emerged as a pivotal element in the competitive landscape of nations, exerting an influence that transcends the economic sector and extends to domains such as education, employment, and social

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inclusion. The ongoing global pandemic has further exacerbated this trend, as organizations have been compelled to allocate substantial resources toward the implementation of digital solutions to ensure business continuity. In the contemporary business landscape, digitization is not merely synonymous with process automation; it is also intricately linked with the implementation of artificial intelligence and big data analytics. These advancements have the potential to unlock novel avenues for innovation and enhance operational efficiency. The Slovak Republic, akin to other European Union member states, confronts the challenge of adapting to global trends while capitalizing on the opportunities presented by digital transformation. The European Digital Decade 2030 policy establishes ambitious objectives in the domains of digital competencies, infrastructure, and the accessibility of online services, thereby establishing a framework for national strategies. It is imperative for Slovakia to allocate resources to the cultivation of its population's digital competencies, the modernization of its infrastructure, and the promotion of innovation to mitigate the exacerbation of regional disparities and the digital divide. The objective of this study is to identify current trends in employee training in the context of digital transformation, assess the state of digitization in Slovakia, and identify barriers that hinder its development. Concurrently, we will concentrate on perspectives and recommendations that can contribute to the more effective use of digital technologies in businesses and public administration. The present moment is of particular consequence in the realm of economic discourse, as the digital economy is rapidly emerging as the foundation for global economic growth. The successful implementation of this digital framework is imperative for the sustained economic development of nations.

## **2. LITERATURE OVERVIEW AND THEORETICAL BACKGROUND**

The digital economy is a contemporary economic system that has emerged as a result of the rapid development of information and communication technologies (ICT) and their integration into all areas of the economy. According to the OECD (2020), this is an economy in which digital technologies are the foundation for value creation, innovation, and productivity. This ecosystem is intricate, encompassing digital products, services, platforms, data flows, and infrastructure. The digital economy is distinguished by the integration of digital technologies to enhance efficiency and reduce costs in production and business processes, thereby enhancing competitiveness. According to the United Nations Conference on Trade and Development (UNCTAD) in 2021, the digital economy is a fundamental component of global trade, and its contribution to Gross Domestic Product (GDP) is increasing at a consistent rate. In 2021, it was estimated that digital data flows were of greater economic importance than

traditional trade flows of goods. The following factors are instrumental in the development of the digital economy:

- The process of digitization can be defined as the transition from conventional paper-based procedures to digital solutions.
- Technological innovation is defined as the implementation of artificial intelligence, the Internet of Things (IoT), and big data analytics.
- A shift in consumer behavior has been observed, characterized by a growing preference for online shopping and digital services.
- Hyperconnectivity is defined as the ability to establish and maintain connections between people, organizations, and devices in real time. This phenomenon is contributing to significant changes in business relationships and the development of new products (Wladawsky-Berger, 2023).

The digital economy is inextricably linked to the concept of *digital transformation*, which refers to the integration of digital technologies into various facets of society, including business processes, public administration, and everyday life. This process has been shown to result in increased efficiency, reduced costs, and the development of new business models. The OECD (2022) underscores the notion that digital transformation constitutes a horizontal megatrend, exerting its influence on economic policy, innovation, employment, and social development. According to YU & JIANG (2024), the digital economy is of paramount importance due to its capacity to enhance productivity through automation and artificial intelligence. This increased productivity has the potential to promote innovation and the emergence of new industries. Furthermore, the digital economy can improve the availability of services and the quality of life for citizens. Finally, the digital economy can strengthen a country's competitiveness in the global market. Consequently, the digital economy is regarded as a pivotal element in promoting economic growth in the 21st century. The development of this sector is contingent upon investments in infrastructure, education, and regulation to ensure inclusive and sustainable growth.

In the context of *contemporary global trends* in digitization, artificial intelligence, and automation, it is evident that digitization has emerged as a pivotal factor in recent economic developments. The repercussions of this phenomenon are evident across diverse sectors, encompassing manufacturing, services, and public administration. According to the OECD (2020), the process of digitization is causing significant changes to traditional business models, leading to increased productivity, and the creation of new opportunities for innovation. The advent of the novel Coronavirus (SARS-CoV-2) pandemic has further exacerbated this trend, as companies and organizations have been compelled to allocate substantial resources toward the development and implementation of digital solutions to ensure business continuity. A prominent trend in this

field is the advancement of *artificial intelligence (AI)*, which has emerged as a pivotal technology for digital transformation. The application of AI encompasses a wide range of disciplines, including predictive analytics, process automation, service personalization, and cybersecurity. According to the OECD (2024), the implementation of artificial intelligence (AI) in G7 countries holds the potential to enhance productivity by 0.3–0.6% annually. However, the impact of AI on productivity is contingent upon the rate of adoption and the accessibility of data. McKinsey (2023) estimates that generative AI could add up to \$4.4 trillion to the global economy by 2030. Another significant trend is *automation and robotization*, which are fundamentally changing the structure of jobs. According to the predictions of the World Economic Forum (2023), approximately 85 million jobs are expected to be eliminated by the year 2030, while 97 million new positions are projected to be created, primarily within the domains of digital industries. Automation has been primarily implemented to manage routine and repetitive tasks, while tasks that require creativity and critical thinking are supported by technology. These global trends also present challenges. These include disparities in the degree of digitization across nations, a dearth of skilled ICT professionals, the necessity for investment in infrastructure (e.g., 5G, data centers), and ethical concerns pertaining to the utilization of AI, such as transparency and privacy issues. Digitalization, artificial intelligence (AI), and automation are therefore regarded as strategic factors for economic growth that will shape the global landscape (WLADAWSKY-BERGER, 2023).

With regard to the significance of digital transformation for economic growth in the *European Union*, digital transformation is regarded as a strategic instrument for promoting economic growth, enhancing competitiveness, and improving the quality of life of citizens in the European Union. Presently, the digital economy stands as a pivotal component of European policy, facilitating enhanced resource utilization, cost reduction, and the development of novel business models. The European Commission has formally adopted the *Digital Decade 2030* policy framework, which establishes explicit objectives in the domains of digital competencies, infrastructure, the digitization of enterprises, and public services. The primary objectives include ensuring that by 2030, 80% of adults possess at least fundamental digital competencies, 75% of businesses utilize cloud services, artificial intelligence, and big data, and all public services are accessible online (European Commission, 2023). According to the OECD (2024), the significance of digital transformation for economic growth is predominantly attributed to its capacity to enhance productivity through automation and the digitization of processes. The implementation of digital technologies by companies has been demonstrated to result in enhanced efficiency, accelerated innovation, and an augmented capacity to respond to market fluctuations. Concurrently, the process of digitization has been shown to reduce transaction costs and

expand opportunities for cross-border trade within the single digital market. This integration of Member States into global value chains has a positive impact on foreign trade and the export of services.

The European Union has adopted a strategy of promoting digital transformation through the implementation of investment programs. The most significant of these programs is the *Digital Europe Program*, which will be in effect from 2021 to 2027. The program's primary focus is on the development of artificial intelligence, cybersecurity, high-performance computing, and digital skills. The objective of the initiative is to expedite the integration of digital technologies, with a particular focus on small and medium-sized enterprises (SMEs), which constitute the fundamental economic foundation of the European Union (European Commission, 2022). Investments in digital infrastructure, including gigabit networks and 5G, are imperative to ensure rapid data transmission and the development of contemporary services. Digital transformation also has a social dimension. Beyond the immediate economic advantages, the internet has been demonstrated to enhance accessibility to public services, e-health resources, educational opportunities, and facilitate communication between citizens and government entities. Concurrently, however, it has become imperative to cultivate digital competencies and to facilitate the retraining of the workforce to mitigate the adverse ramifications of automation on employment. Consequently, the European Union places significant emphasis on an inclusive approach to ensure the accessibility of digital technologies across all regions and social groups (European Commission, 2025).

In the context of Slovakia's state and prospects of the digital economy, digitization has become a primary economic policy objective. However, the degree to which Slovakia has digitized lags behind that of developed countries in the European Union. According to the DESI (Digital Economy and Society Index), which evaluates the digital performance of EU member states, Slovakia has consistently received a ranking that falls within the range of average to below average. In 2023, Slovakia's performance lagged behind the EU average, particularly in the domains of digital skills among the population and the adoption of digital technologies in small and medium-sized enterprises (European Commission, 2023). According to data from the European Commission, Slovakia exhibits substandard performance in the domains of electronic public services, cloud solution utilization, and online sales. A recent study revealed that the proportion of small and medium-sized enterprises utilizing online sales has declined from 17% in 2020 to approximately 13% in the present year. In the DESI ranking, Slovakia ranked 23rd out of 27 EU member states in 2022, indicating a significant lag behind the V4 countries (FonTech, 2022). Nonetheless, the outlook for the future remains optimistic. To enhance its global competitiveness, Slovakia must prioritize investments

in digital infrastructure, foster innovation, and cultivate digital competencies. As part of its "Digital Decade" initiative, the European Union underscores an inclusive approach to ensure that digital technologies are accessible to all regions and social groups (European Commission, 2025).

A significant challenge is the inadequate level of digital literacy among the population. According to data from the European Commission, approximately 54% of Slovakia's population possesses fundamental digital competencies, which falls short of the EU average of over 60%. The dearth of qualified IT professionals represents a substantial impediment to the development of the digital economy. This phenomenon is also evidenced by the gradual integration of artificial intelligence, cloud services, and big data solutions into business practices (OECD, 2022). Recent advancements in Slovakia's digital infrastructure have been observed, with a notable expansion in high-speed internet and mobile network coverage. The deployment of 4G coverage is nearing completion, and the 5G network, which is pivotal for the advancement of contemporary digital services, is undergoing a gradual expansion. However, the availability of gigabit networks remains constrained, particularly in rural regions, which hinders the development of e-commerce and digital services beyond major metropolitan areas (European Commission, 2023). According to the OECD (2022), the Slovak Republic has initiated a series of e-service initiatives within the context of public administration digitization. The following are included: The advent of e-government, electronic healthcare, and electronic tax filing represents a paradigm shift in the way in which government functions and interacts with its citizens. However, these services frequently encounter challenges related to user-friendliness, interoperability, and cybersecurity. The absence of adequate integration among systems necessitates that citizens and businesses repeatedly furnish identical data, thereby diminishing the efficiency and reliability of state-provided digital services (OECD, 2022). Another area in which Slovakia exhibits a notable deficit is the digitization of the business sector. It has been determined that small and medium-sized enterprises, which are considered to be the foundation of the Slovak economy, utilize digital technologies only in a limited capacity. According to data from the European Commission, approximately 30% of Slovak companies utilize cloud services, while the EU average exceeds 40%. The implementation of artificial intelligence is even lower, which limits the possibilities for increasing productivity and competitiveness (European Commission, 2023). Consequently, Slovakia is confronted with the imperative to expedite the process of digitization across all sectors, encompassing infrastructure, business, and public administration. It is imperative to allocate resources towards the cultivation of digital competencies, the promotion of innovation, and the facilitation of access to contemporary technologies across all geographical areas. It is only in

this manner that the latent potential of digital transformation can be tapped, thereby catalyzing economic growth and enhancing the quality of life for the population.

### **3. PROBLEM FORMULATION AND METHODOLOGY**

The research task is focused on the analysis of the problematic aspects regarding the development of Slovak economy in terms of digitization processes issues affected by Industry 4.0 elements implementation and find out their consequences. The research will be focused on exploring the Slovak digital economy analyses and the further development under the Industry 4.0 conditions reflecting the impacts on education system, training and employment. To put in other words, the main goal of this paper is by means of analysis, comparative analysis methods followed by logical deduction to figure out the potential benefits for Slovak national economy development coming out of digital economy aspects being implemented in Slovak manufacturing sector. The paper is focused on problematic aspect analyses such as the current status of digital economy to implement Industry 4.0 technologies like digitization tools and communication and information technologies into Slovak economy and industry. The main object of the paper is to figure out whether and to what measure digitization tools, new technologies might affect the new job creation along with the labor force adaptability to it reflecting the possible changes in education system and training. For the most objective assessment of the changes being awaited by Slovak economy and manufacturing industry and services due to the implementation of digital economy tools, the comparative analysis as the basic research method.

To accomplish this goal, methods such as analysis, comparison, synthesis and logical deduction are to be used. Subsequently the analysis will lead to synthesis and prognosis by means of abstraction method eliminating the less important factors to set general statements and opinions. Data and for the analysis are withdrawn from the respected and reliable institutions such as EUROSTAT, Ministry of Economy of Slovak Republic, Slovak Statistical Office, and OECD have achieved high recognition from the governments of countries being evaluated as well as businesses, and therefore they are considered as authoritative sources in this field. For the most objective assessment of the changes being awaited by the Slovak authorities approach due to the implementation of Slovak digital economy policy, the theoretical analysis method has been chosen as the basic research method the researchers were approached by.

### **3. PROBLEM SOLUTION AND RESULTS**

This chapter will address the analysis of the Slovak government's strategies and approaches to the development of the digital economy. The Slovak government has adopted a strategic approach to the development of the digital economy, with the Slovak Digital Transformation Strategy 2030 serving as the overarching framework. The strategy emphasizes the cultivation of competencies and the development of infrastructure, particularly in the domain of 5G technology. It also fosters a conducive legislative environment and leverages EU financial resources to enhance the economic competitiveness and innovation capacity of the region. Key strategies and approaches aimed at transforming Slovakia into a modern, smart, and competitive digital economy that will benefit both citizens and businesses include:

- *The Comprehensive Digital Strategy (Slovakia 2030)* is a government plan that integrates informatization and digital transformation across various sectors of society, extending beyond the IT sector. The primary objective of the initiative is to modernize the state through the implementation of e-government, the cultivation of digital skills, and the promotion of the digital economy (Vokoun, 2024).
- *The importance of business innovation and digitization* in supporting small and medium-sized enterprises (SMEs) in implementing digital processes, utilizing technologies such as artificial intelligence (AI) and the Internet of Things (IoT), and enhancing digital readiness to boost competitiveness, as highlighted in the study by Hamranová & Töröková (2021), is paramount.
- *The development of digital infrastructure* constitutes a fundamental pillar of the digital economy. This development encompasses the construction and modernization of telecommunications infrastructure, including 5G networks and data centers (International Trade Administration, 2024).
- *Digital literacy* is a critical component of contemporary society, and the investment in education and the enhancement of the digital competencies of the population and workforce is paramount for the effective utilization of digital instruments (National Coalition for Digital Skills and Jobs, 2023).
- *Legislative and regulatory support* are fundamental for the establishment of legal frameworks that facilitate digital innovation, personal data protection (e.g., GDPR), and equitable conditions for digital business. Such support is instrumental in ensuring sustainable development (White & Case LLP, 2021).
- It is imperative to *employ European funds* in a manner that optimizes the utilization of EU financial instruments, such as the Recovery and Resilience Facility (RRF) and operational programs, to ensure the financing of digital projects and innovation (European Commission, 2021).

With respect to national strategies and concepts for digitization, Slovakia's digital transformation is guided by a set of strategic documents that respond to global trends and European initiatives. The foundational framework is the *Strategy for the Digital Transformation of Slovakia until 2030*, which delineates the trajectory in the domains of infrastructure, digital skills development, cybersecurity, and innovation support. This document is consistent with the objectives of the European Union's Digital Decade, which establishes specific milestones for 2030, including the attainment of a high level of digital competence among the majority of the population and the provision of comprehensive high-capacity network coverage (European Commission, 2024). According to the findings of the European Union, the Slovak Republic exhibits substandard performance with regard to digital competencies and the integration of contemporary technologies within its business sector. This observation underscores the necessity for augmented investment in educational initiatives and infrastructural development. The National Digital Skills Strategy, therefore, emphasizes the development of skills across the population—from students and teachers to seniors and workers in vulnerable professions. The strategy encompasses the implementation of retraining programs, the provision of support for lifelong learning, and the cultivation of specialized skills in artificial intelligence, data analytics, and cybersecurity (MIRRI & Digital Coalition, 2023). In addition to educational initiatives, national concepts prioritize the development of digital infrastructure. The Slovak Republic's Recovery and Resilience Plan encompass initiatives to augment high-capacity networks and digitize public administration, which should facilitate more efficient service delivery to citizens and businesses. Eurostat (2024) has noted that the proportion of Slovak households with access to high-speed internet remains below the EU average, thereby creating a barrier to the development of the digital economy. From an economic policy perspective, it is imperative that these strategies be implemented in a coordinated manner and that their impact on competitiveness and social inclusion be regularly assessed. It is only through this strategic approach that Slovakia can capitalize on the transformative power of digitization to foster economic growth and enhance the quality of life for its citizens (European Commission, 2024).

In regard to the *promotion of innovation, startups, and technology companies*, Schwab (2022) posits that innovation constitutes a fundamental pillar of digital transformation and a pivotal factor in economic competitiveness. In an environment characterized by rapid technological progress, startups and technology companies are emerging as agents of change that exert influence not only on economic growth but also on the structure of the labor market and the quality of life. Consequently, Slovakia places significant emphasis on the necessity to establish a foundation that fosters the development of an innovative

ecosystem in its strategic documents. This initiative aims to support the emergence of novel business models and the integration of contemporary technologies. A variety of instruments are employed to provide support for innovation. Grant schemes and programs financed by European funds play a pivotal role in facilitating the acquisition of capital by startups for the development of products and services. The World Bank has identified the availability of financing as a critical factor in the success of young technology companies, particularly in countries with smaller domestic markets (World Bank, 2023). In addition to financial support, incubators and accelerators that provide start-ups with expert advice, mentoring, and access to investors are also important. These initiatives facilitate the connection between academic institutions and the business sector, thereby accelerating the commercialization of research findings and the development of novel solutions (OECD, 2023). A salient trend pertains to the emergence of digital platforms that facilitate the entry of startups into global markets, obviating the necessity for substantial infrastructure. The advent of cloud solutions, big data analytics, and artificial intelligence has engendered a paradigm shift, enabling small businesses to contend with established entities and proffer customized products and services. The ITU (2023) has emphasized in its reports that digital platforms have become the foundation for international business expansion. However, these platforms also impose significant demands on cybersecurity and data protection measures. In addition to the utilization of financial instruments, the establishment of a conducive regulatory environment is imperative. The simplification of administrative processes, the promotion of digital services in public administration, and the introduction of electronic systems for communication with authorities have been demonstrated to reduce barriers to market entry. The OECD (2023) emphasizes that the effective linkage of regulatory reforms with investments in infrastructure and education is pivotal to the sustainable development of an innovation ecosystem. Therefore, providing support for nascent businesses and technology companies entails more than merely addressing their financial needs; it necessitates a multifaceted approach that encompasses infrastructure, education, regulation, and international cooperation. In order to leverage the potential of digitalization to strengthen its position in the global economy, Slovakia must implement policies that promote digital transformation (Schwab, 2022; World Bank, 2023).

The evolution of the digital economy is inextricably linked to the presence of *robust infrastructure and the prevalence of digital competencies*. The potential of digitization cannot be fully realized by Slovakia in the absence of modern networks and an educated workforce. Investments in infrastructure are imperative for the provision of high-speed internet, the development of cloud services, and the implementation of artificial intelligence technologies. Absent these competencies, enterprises and public administration are impeded in their capacity to effectively engage

within the digital ecosystem (ITU, 2023). A primary objective is to augment high-capacity networks and extend coverage to rural areas that have been historically under-resourced. International organizations such as the World Bank have underscored the significance of high-quality digital infrastructure in the contemporary era, likening it to transport networks in terms of its role in facilitating access to services, education, and business opportunities (World Bank, 2023). As part of its Recovery Plan, the Slovak Republic is allocating resources to the development of optical networks and 5G technologies, which are of fundamental importance for businesses and households alike. Investments in digital competencies are equally crucial. The possession of technology alone is insufficient; the utilization of that technology by qualified individuals is paramount. According to UNESCO (2022), it is imperative that digital education be incorporated into the broader framework of lifelong learning to avert the emergence of a digital divide. Slovak strategies, therefore, support the integration of digital skills into school curricula, the development of retraining programs, and specialized courses in areas such as cybersecurity and data analytics. Investments in infrastructure and skills are interlinked; the absence of a high-quality network hinders the efficacy of digital education, and in the absence of educated users, the infrastructure remains underutilized. Consequently, there is an imperative to coordinate these measures and assess their repercussions on competitiveness and social inclusion. Achieving this objective is imperative for Slovakia to successfully navigate its digital transformation and ensure the sustainability of its economic growth (ITU, 2023; World Bank, 2023).

#### **4. DISCUSSION – RECOMMENDATIONS AND IMPLICATIONS**

With respect to *prospects and recommendations*, the Slovak Action Plan for Digital Transformation 2023–2026 places significant emphasis on the advancement of artificial intelligence within the industrial sector, the digital transformation of small and medium-sized enterprises (SMEs), the enhancement of digital competencies, and the development of data infrastructure. The objective is to align national priorities with the EU Digital Decade framework, which establishes strategic milestones for 2030 (MIRRI, 2022). The outlook for Slovakia is favorable, contingent upon the effective utilization of available European funds, the promotion of innovation, and the establishment of an environment that will encourage both businesses and the public sector to undergo digital transformation. The cooperation between the state, academia, and the private sector will be a pivotal factor in Slovakia's transition from below the EU average to the group of digitally advanced countries (OECD, 2023). Achieving these objectives necessitates the implementation of the following strategies:

- Scaling pilot projects in public administration to integral state systems, with the recommendation to incorporate feedback from end users.
- Supporting SMEs through financial incentives and advisory services for the implementation of cloud solutions, e-commerce, and cybersecurity.
- Developing digital skills – investing in education, retraining, and lifelong learning to minimize the negative impacts of automation on employment.
- Building data infrastructure – expanding 5G networks, data centers, and secure cloud services.
- Ethical and legal frameworks for AI – ensuring algorithm transparency, privacy protection, and responsible use of artificial intelligence in accordance with European legislation (European Commission, 2025; OECD, 2023).

The development of the digital economy in Slovakia is influenced by a combination of positive factors and obstacles that determine the pace and scope of digital transformation. While the digitization process signifies a substantial opportunity to enhance competitiveness and economic growth, its execution is encumbered by numerous barriers. Among the primary barriers to the advancement of the digital economy, the foremost is the *lack of skilled labor*. According to data from the European Commission, Slovakia exhibits one of the lowest proportions of ICT specialists among the member states of the European Union, with approximately 4.2% of the total workforce falling into this category. This figure falls short of the EU average, as reported by the European Commission in 2023. This shortage has the potential to impede the implementation of artificial intelligence, automation, and cloud solutions within business contexts. The second barrier pertains to regional disparities in digital infrastructure. Despite the relatively robust high-speed internet coverage in urban areas, the availability of gigabit networks in rural regions remains limited, impeding the development of electronic services and business activities beyond major metropolitan centers (OECD, 2022). A further challenge pertains to the *limited digitization levels observed among small and medium-sized enterprises* (SMEs). According to DESI, the utilization of cloud services among Slovak companies remains modest, with only approximately 30% of them employing such technologies, a figure that stands in contrast to the EU average of over 40%. The implementation of artificial intelligence is even lower, which limits the potential for increasing productivity and competitiveness (Eurostat, 2024). Another barrier pertains to the substantial investment costs associated with modernizing production processes and implementing digital solutions. Many SMEs lack the financial resources to undertake these investments independently, necessitating support from state or European funds. Inadequate cybersecurity constitutes a substantial impediment. In the contemporary

context of digitalization, the *risk of cyberattacks* is increasing, and many companies lack adequately developed security mechanisms. This phenomenon extends to the realm of public administration, marked by a dearth of a cohesive data protection strategy and systemic interoperability (Drahošová, Čajková, 2024).

Notwithstanding the aforementioned barriers, a plethora of opportunities exist for the development of the digital economy, which has the potential to propel Slovakia towards a more prosperous future. One such initiative is the *utilization of European funds and programs*, including the Digital Europe Program, which allocates financial resources to projects in the domains of artificial intelligence, cybersecurity, and digital skills (European Commission, 2022). Another opportunity is the development of the population's digital skills through education programs and retraining, which will enable better adaptation to the changing labor market (OECD, 2022). The potential exists for Slovakia to *develop innovation centers and startups* focused on digital technologies. The establishment of digital innovation hubs (EDIH) facilitates the translation of technological advancements into operational realities, thereby assisting small businesses in the integration of contemporary solutions. The *digitization of public services* represents a significant opportunity to enhance the efficiency of public administration, alleviate the administrative burden, and expand the accessibility of services for citizens (MIRRI, 2022). The European Commission (2025) posits that, if Slovakia can overcome the barriers to its digital economy's development and take advantage of the opportunities available to it, the digital economy will become an engine of economic growth, increase the country's competitiveness, and improve the quality of life of its inhabitants.

The impact of digitization on economic growth and society is a multifaceted phenomenon that has been the subject of extensive research. A substantial body of literature has emerged that demonstrates the significant impact of digitization on society, as well as its role in facilitating economic recovery. The implementation of blockchain technology has been demonstrated to enhance work efficiency, reduce operational expenses, optimize public administration, and facilitate the development of novel business models and employment opportunities. Consequently, it has been demonstrated to provide substantial support for enhancing productivity and affecting transformative changes in the lives of citizens. However, this transition concomitantly introduces challenges, including cybersecurity concerns and the necessity of acquiring new competencies. It is a significant catalyst for economic modernization (OECD, 2023). *The impact of digital technologies on economic growth* is multifaceted. Firstly, there is an increase in productivity and efficiency. The automation of processes and implementation of intelligent systems leads to a reduction in errors and an acceleration in operations. Secondly,

new markets and innovation are created. The emergence of digital platforms and technologies, such as artificial intelligence (AI) and big data, gives rise to new sectors and business opportunities. Thirdly, there is a reduction in costs. Electronic commerce and digital communication result in a decrease in the operating expenses of companies. Finally, e-governance facilitates streamlined interaction between businesses and authorities, leading to a reduction in administrative burdens and conservation of resources (Yu & Jiang, 2024). *The impact on society* is multifaceted and includes, but is not limited to, the following:

- Changes in the labor market, including the creation of new digital professions and the disappearance or transformation of old ones, which necessitates retraining;
- Availability of services, including improved access to education (e.g., e-learning), healthcare (e.g., telemedicine), and public services;
- Digital communication, which simplifies connections between people and facilitates the sharing of information;
- New challenges, such as digital inclusion/exclusion, cybersecurity, and privacy protection (European Commission, 2025).

With regard to the impact of digitization on economic growth and productivity, it is evident that the implementation of smart technologies plays a pivotal role in *stimulating economic growth and productivity*. At the macroeconomic level, digital innovations have been shown to increase resource efficiency, reduce operating costs, and enable greater production flexibility. The OECD (2022) has indicated a positive correlation between the degree of digitization and the rate of growth in gross domestic product, suggesting that nations with more advanced digitization exhibit accelerated productivity growth. In a similar vein, Eurostat (2024) has reported that companies that utilize cloud technologies, artificial intelligence (AI), and data analytics have been shown to achieve higher value added per employee. According to the OECD report *Job Creation and Local Economic Development* (2024), the Slovak Republic has demonstrated a correlation between regional digitization levels and economic development indicators. Specifically, regions such as Bratislava, which are more digitally advanced, have exhibited *employment and productivity growth rates* that surpass the national average. In contrast, less digitized regions in the eastern part of the country have experienced below-average growth rates in these key economic indicators. This disparity underscores the imperative for ongoing digital transformation beyond major metropolitan hubs. According to Eurostat (2024), the proportion of banks and financial institutions employing artificial intelligence (AI) in the Slovak financial sector increased by 15% between 2022 and 2024, resulting in an average reduction in operating costs of 8%. Concurrently, the process of digitization has been identified as a catalyst for the *expansion of Slovak companies into global markets*. E-commerce platforms empower companies to establish a presence in new markets

without the necessity for physical infrastructure. According to Eurostat (2024), approximately 20% of Slovak small and medium-sized enterprises engage in cross-border online business activities. This trend is evidenced by an increase in the exportation of services and a concomitant strengthening of Slovakia's position within international supply chains. However, it should be noted that the increase in productivity is not linear. However, Slovak SMEs encounter challenges in *fully integrating AI* into their operational processes. Frequently, these initiatives are limited to pilot projects, with systematic integration into daily operations remaining deficient (Eurostat, 2024; OECD, 2022). There is therefore a need to translate digital investments into sustainable performance improvements through changes in organizational processes, employee training, and the digitization of internal systems. From a strategic perspective, Slovakia has the opportunity to increase its economic growth through the following aspects: *Investment in infrastructure* – gigabit network coverage and 5G are prerequisites for digital services and industrial applications (Digital Decade SR, 2024); *Development of digital skills* – improving employee qualifications helps transform technological investments into productivity (OECD, 2022); *Innovative tools* – the use of EDIH, Digital Europe funds, and national programs increases the absorption capacity of the economy. Groundbreaking initiatives such as AI ImpactSK (2025) examine the adoption of AI in companies (statistical models, international benchmarks) and provide recommendations for effective integration. The study estimates that companies with a clear AI strategy show up to 12% higher productivity compared to companies without such a strategy. Digitalization is of high strategic importance for the Slovak economy. If technological and personnel barriers can be overcome and digital solutions can be consistently integrated into all levels of the economy, productivity and long-term growth can accelerate significantly.

In terms of their impact on employment, quality of life, and education, digitization, automation, and artificial intelligence are transformative factors that are fundamentally changing the structure of the Slovak economy. The implementation of these policies has ramifications for economic growth, as well as for the social and educational sectors. This process is associated with opportunities to increase productivity, but also with risks of inequality, which require thoughtful political and institutional responses (Brynjolfsson & McAfee, 2021; IMF, 2025). The impact is most pronounced in the employment sector. The increasing automation of routine tasks has been observed to have resulted in a steady decline in employment opportunities within the fields of administration and services. Concurrently, there has been a proliferation of new positions that demand a combination of digital and analytical competencies (Majzlíková, 2021). Research by the OECD (2023) emphasizes that this is not a widespread disappearance of jobs, but rather their transformation. Professions that require a high degree of creativity, social interaction, and decision-making

are gaining in importance. A pivotal factor in this regard is the capacity of workers to adapt through retraining and lifelong learning (Schwab, 2022). Digitalization also possesses a social dimension that impacts quality of life. The digitization of public services, the development of e-health, and the simplification of administrative processes have been shown to save citizens time and increase their comfort (European Commission, 2024). Concurrently, however, the risk of a digital divide is escalating, particularly between urban and rural areas, but also between generations. A review of relevant literature reveals that insufficient coverage by high-capacity networks and low levels of digital skills among a segment of the population may result in the underutilization of the benefits of digitization (World Bank, 2023). It is therefore essential to allocate resources towards the development of infrastructure and the support of inclusive digital literacy programs (OECD/MIRRI, 2022–2025). Education plays a pivotal role in this process. The National Digital Skills Strategy underscores the imperative to incorporate digital competencies into all echelons of education, while concurrently fostering the cultivation of specialized proficiencies in domains such as artificial intelligence, data analytics, and cybersecurity (MIRRI & Digital Coalition, 2023). In addition to formal education, the development of a system of retraining and lifelong learning programs is imperative to enable workers to adapt to changing labor market conditions (Brynjolfsson & McAfee, 2021; OECD, 2023). From an economic policy perspective, it is imperative that Slovakia leverage its technological potential to foster inclusive growth. This necessitates a concerted response, encompassing measures such as fostering innovation and investment in infrastructure, along with the cultivation of human capital. Failure to implement these measures could potentially exacerbate existing regional and social disparities, thereby counteracting the positive impacts of digitalization (European Commission, 2024; Schwab, 2022).

The impact on foreign trade and competitiveness is crucial. Digitization and automation are fundamentally changing the conditions of international trade and the competitiveness of Slovak companies. In a globalized environment, digital technologies are becoming a decisive factor for success – they influence the speed of response to market changes, the quality of services, and the ability to participate in global value chains (Brynjolfsson & McAfee, 2021; Schwab, 2022). Modern manufacturing processes, electronic trading platforms, and the use of artificial intelligence in logistics and marketing enable companies to reduce costs, shorten delivery times, and increase efficiency (European Commission, 2024). For Slovakia, as a small open economy, digitalization is particularly important. Export-oriented industries, especially the automotive industry, are facing pressure to introduce smart manufacturing systems and automated lines. Companies that are able to implement Industry 4.0 principles gain a competitive advantage in the form of greater flexibility and the ability to respond to individual customer requirements

(World Bank, 2023). Conversely, companies that neglect digitalization risk losing contracts and being gradually squeezed out of global chains (OECD, 2023). According to Eurostat (2024), the digitization process has a significant impact on business models. The advent of e-commerce and digital platforms has enabled Slovak companies to access new markets without the necessity of a physical presence. Concurrently, the competition from foreign entities that utilize advanced analytical tools and automated marketing strategies is escalating. This emphasis is placed on innovation, cybersecurity, and the ability to work with big data. In the contemporary global context, a nation's ability to maintain competitiveness is inextricably linked to the quality of its digital infrastructure and the availability of a skilled workforce. In its assessments, the European Commission has noted that Slovakia exhibits deficiencies in two key areas: high-capacity network coverage and digital skills. These shortcomings have the potential to impede the country's ability to adapt to evolving business conditions (European Commission, 2024). Eurostat (2024) also points out that the share of Slovak companies using cloud services and big data is still below the EU average, which reduces their ability to compete in foreign markets. From an economic policy perspective, it is therefore essential to support innovation, the development of digital skills, and infrastructure development. It is imperative for Slovakia to leverage the transformative power of digitalization to fortify its standing in the global economic landscape and safeguard its long-term competitiveness (MIRRI, 2024; OECD, 2023).

## **5. CONCLUSION**

In conclusion, it is evident that digitization and the development of the digital economy represent a fundamental megatrend that affects all areas of the economy and social life. A thorough analysis has demonstrated that digital transformation is a pivotal factor in enhancing a nation's productivity, competitiveness, and innovation potential. Despite some progress, Slovakia still lags behind the European Union average, particularly in terms of the digital skills of its population, the adoption of modern technologies in small and medium-sized enterprises, and the development of digital infrastructure. The DESI index and other relevant indicators underscore the necessity for increased investment in education, infrastructure, and innovation support. Digital transformation represents a strategic opportunity for Slovakia to enhance its competitiveness and stimulate economic growth. The implementation of European strategies and the utilization of EU financial instruments will facilitate the modernization of infrastructure, support for innovation, and the development of digital skills among the population. The attainment of these objectives will position digital transformation as a primary catalyst for the nation's economic advancement in the forthcoming years.

Generally speaking, global trends such as artificial intelligence and automation present both opportunities and challenges. On the one hand, they facilitate cost reduction, increased efficiency, and the emergence of new business models; on the other hand, they engender the necessity of workforce retraining and solutions to issues of cybersecurity and digital inclusion. To address these challenges, Slovakia must implement a multifaceted approach, encompassing not only technological investments but also the development of human capital and the creation of a conducive legislative environment. From an economic policy perspective, it is imperative to align national strategies with the EU Digital Decade framework and to leverage available European funds effectively. Key priorities include the expansion of high-capacity networks, the support of the digitization of SMEs, the development of digital skills across the population, and the construction of data infrastructure. It is equally imperative to establish conditions conducive to innovation, start-ups, and technology companies, which have been identified as the primary drivers of change and economic growth. If Slovakia can successfully adapt to global trends and overcome the barriers that impede its progress, digital transformation will become one of the primary drivers of economic development. The proposed initiative is expected to yield several key benefits, including enhanced productivity, the creation of new employment opportunities, the improvement of public services, and the strengthening of the country's integration into global value chains. However, achieving success in this endeavor is contingent upon a concerted effort by the state, the private sector, and the academic community to ensure the inclusive and sustainable development of the digital economy for the benefit of society as a whole.

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## PREPARATION OF GENERATION Z FOR THE LABOUR MARKET: IMPLICATIONS AND APPLICATIONS IN HUMAN RESOURCE MANAGEMENT

*Simona KOSÁKOVÁ*<sup>1</sup>

**Abstract:** *Generation Z is entering the labour market with distinct expectations regarding education, skills development, and the working environment, creating new challenges for human resource management. The aim of this paper is to examine the perceived preparedness of Generation Z for the labour market from the perspective of university students and to identify its implications and strategic applications for HRM. The empirical part of the study is based on a quantitative questionnaire survey conducted among Generation Z students, with responses recorded on a five-point Likert scale. The research focuses on areas such as practical skills, the integration of theory and practice, university–industry cooperation, the use of modern educational methods, and perceived readiness for a dynamic labour market. The data were analysed using descriptive statistics, correlation analysis, and the chi-square test of independence in order to identify relationships between selected variables. The results highlight the importance of practice-oriented education, internships, and modern learning approaches as key factors supporting the employability of Generation Z. The findings also provide relevant implications for strategic human resource management, particularly in the areas of competency development, adaptation of HR processes, and the building of a sustainable talent base for organisations.*

**Keywords:** Generation Z; labour market preparation; strategic human resource management; practical skills; education

**JEL Classification:** J24, M12, I23

### 1. INTRODUCTION

The entry of Generation Z into the labour market significantly affects contemporary human resource management, as young employees bring new values, expectations, and preferences. Prund (2021) points out that globalisation, technological transformation, and generational diversity force organisations to reconsider HRM processes, which are becoming more strategic and increasingly oriented towards the individual needs of young employees. These changes take place simultaneously with the rapid transformation of the labour market, in which demand for new skills is emerging. Wang and Ma (2024) emphasise that young workers face rapid obsolescence of competencies and high demands from new sectors such as artificial intelligence and e-commerce, while career motivation and social networks significantly influence their career satisfaction and adaptability. The expectations of Generation Z towards employers differ from those of

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previous cohorts. Roy et al. (2022) state that Generation Z places greater emphasis on development opportunities, learning, and growth than on financial benefits, which were dominant among Millennials. Employer attractiveness therefore crucially depends on offering flexible working conditions, clear career paths, and opportunities to gain experience. This trend is also confirmed by Weerasombat et al. (2022), according to whom employer attractiveness in a changing labour market depends on organisations' ability to support career capabilities, resilience, and positive work attitudes among young job applicants. Technological progress also significantly changes the demands placed on HRM practices. Pato et al. (2022) note that recruitment and training are most affected by digitalisation and Industry 4.0, which requires the adaptation of HR processes to modern technologies and new competency requirements. Generation Z, as a digital cohort, naturally expects the working environment to utilise modern technological tools also in the area of people management. An important role in young people's labour market readiness is also played by the development of human capital. Singh et al. (2022) found that longer job tenure leads to higher wages, highlighting the importance of building specific skills and longer-term employment relationships. For Generation Z, which often prefers flexibility and rapid change, this represents a challenge but also an opportunity for HRM to create conditions that support development while motivating young employees to remain in organisations for longer periods. The literature also agrees that Generation Z faces several barriers in the labour market, ranging from rapid technological change and high work pressure to barriers related to inclusion. Wang and Ma (2024) recommend creating support programmes, reskilling initiatives, and fair working environments that enable young people to adapt to dynamic conditions. Jagielska (2022) highlights the importance of educational and professional career planning for Generation Z in the context of dynamic labour market changes. Based on qualitative research, motivation is identified as a key factor in educational success and the achievement of personal and professional goals, which directly influences young people's readiness for working life. From a workplace perspective, Robak (2023) emphasises the importance of information as a strategic resource, particularly under conditions of remote work. The results of her quantitative research show that Generation Z positively evaluates the speed of information exchange in remote work; however, they also highlight the importance of the supervisor's role in managing information flows, which has implications for strategic HRM and the design of hybrid work models. Nowak et al. (2025) identify the main factors influencing Generation Z's approach to work, including adequate financial remuneration, flexibility, a positive work atmosphere, and an emphasis on non-exploitative working conditions. Similarly, Řehoř et al. (2025) point to the importance of financial stability, career growth, personal development, and organisational support as key motivational

factors for Generation Z. The heterogeneity of Generation Z's value orientations is emphasised by Veredyuk and Chernykh (2022), who point to differences in young people's work preferences, particularly in relation to ethical organisational behaviour, corporate social responsibility, and opportunities for professional growth. These findings support the need for flexible and differentiated HR strategies aimed at attracting and developing Generation Z talent.

Recent literature indicates that the entry of Generation Z into the labour market significantly influences contemporary approaches to human resource management. Husein, Purnama, and Manurung (2025) emphasise that the distinctive characteristics of Generation Z—particularly strong reliance on digital technologies, demand for work flexibility, and emphasis on work–life balance—require organisations to adapt traditional HR strategies. According to the authors, the successful adaptation of Generation Z is largely dependent on the digitalisation of HR processes, the use of social media in employer branding, and the development of empathetic and adaptive leadership. The importance of understanding generational differences in the workplace is further highlighted by Wang et al. (2025), who identify persistent challenges related to recruitment inefficiencies, inadequate incentive systems, and difficulties in managing young employees. The authors argue that these challenges stem from differences in values, expectations, and work attitudes of Generation Z, underscoring the need to integrate generational awareness into HR policies and to strengthen managerial competencies that support inclusion and effective workplace adaptation. The role of soft skills in preparing Generation Z for the labour market is addressed by Furxhiu et al. (2025), who demonstrate that competencies such as communication, creativity, emotional intelligence, and adaptability have a significant impact on employability, productivity, and professional competitiveness. Their findings confirm that the systematic development of soft skills represents a strategic priority for human resource management in responding to the evolving demands of the labour market.

In summary, Generation Z represents a dynamic and value-oriented cohort that significantly influences HRM. Organisations must adapt their processes towards personalisation, digital transformation, support for career development, and the creation of inclusive workplaces. Successful integration of young employees thus becomes a key determinant of companies' future competitiveness.

## **2. METHODOLOGY**

The aim of this paper is to examine the attitudes of Generation Z towards preparation for the labour market and subsequently apply the obtained findings in the field of strategic human resource management. To fulfil the

stated objective, a quantitative research approach was adopted, which enables the systematic examination of respondents' attitudes through a standardised questionnaire.

Data collection was carried out through a questionnaire survey developed by the authors with the aim of obtaining relevant data from university students representing Generation Z. The questionnaire included items focused on evaluating the linkage between theoretical education and practical experience, preparation for the labour market, and the importance of cooperation between universities and enterprises. Individual items were assessed using a five-point Likert scale, where the value of 1 represented "strongly disagree" and the value of 5 represented "strongly agree". The empirical research was conducted in the period from September 2025 to November 2025 through an online questionnaire survey. A total of 913 valid responses from university students were included in the analysis, comprising 317 men and 596 women. The collected data were processed and analysed using the statistical software SPSS and, additionally, Microsoft Excel. For data evaluation, descriptive statistics were used to characterise the distribution of respondents' answers, and the chi-square test of independence was applied to examine differences in respondents' attitudes depending on gender.

The research was based on the following research questions:

**RQ1:** What are the attitudes of Generation Z members towards preparation for the labour market, with a focus on the linkage between theoretical education and practical experience?

**RQ2:** Are there statistically significant differences in Generation Z's attitudes towards preparation for the labour market depending on the respondents' gender?

The selected methodology enabled a systematic examination of Generation Z's attitudes and created a basis for the formulation of conclusions and recommendations applicable in the field of strategic human resource management.

### **3. FINDINGS**

Within the analysis of the results, respondents' answers to three selected questionnaire items focused on the preparation of Generation Z for the labour market were compared. Specifically, these items concerned the evaluation of the effectiveness of teaching that combines theoretical knowledge with practical experience, the need to revise the study programme with a greater emphasis on the development of practical skills, and the importance of close cooperation between universities and enterprises in gaining practical experience. The tabular presentation makes

it possible to observe the number of respondents' answers to individual questions with regard to their gender.

**Table 1 Relationship between gender and the evaluation of the effectiveness of combined instruction**

**Crosstab**

		Teaching that combines theoretical knowledge with practical experience is the most effective for me.			Total
		1	3	5	
Gender women	Count	8	30	279	317
	Expected	6,6	22,6	287,8	317,0
men	Count	11	35	549	595
	Expected	12,4	42,4	540,2	595,0
Total	Count	19	65	828	912
	Expected	19,0	65,0	828,0	912,0

Source: SPSS

In the sample of respondents, a high level of agreement with the statement that teaching combining theoretical knowledge with practical experience is the most effective prevailed among both women and men. The highest level of agreement was expressed by the majority of women (279 out of 317) as well as men (549 out of 595), while responses indicating a lower level of agreement were only marginally represented in both groups. The distribution of responses indicates a uniform perception of the importance of linking theory and practice regardless of gender.

**Table 2 Test statistics**

**Chi-Square Tests**

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4,587 <sup>a</sup>	2	,101
Likelihood Ratio	4,430	2	,109
Linear-by-Linear Association	3,541	1	,060
N of Valid Cases	912		

Source: SPSS

The results of the chi-square test did not demonstrate a statistically significant relationship between gender and the evaluation of the effectiveness of the combination of theoretical and practical instruction,  $\chi^2(2, N = 912) = 4.587, p = 0.101$ . Based on these results, no statistically significant differences were identified between men and women in their attitudes towards this type of instruction.

Across all respondent groups, a high level of agreement with the given statement prevailed, with the distribution of responses being comparable between genders. The results suggest that the importance of linking theoretical knowledge with practical experience is perceived consistently within Generation Z regardless of gender.

**Table 3 Relationship between gender and the need for a practical orientation of study**

		My study programme should be revised with a greater emphasis on practical skills and preparation for the labour market.			Total
		1	3	5	
Gender women	Count	39	105	173	317
	Expected Count	36,5	94,5	186,0	317,0
men	Count	66	167	362	595
	Expected Count	68,5	177,5	349,0	595,0
Total	Count	105	272	535	912
	Expected Count	105,0	272,0	535,0	912,0

Source: SPSS

The majority of respondents of both genders tended to agree that the study programme should be revised with a greater emphasis on the development of practical skills and preparation for the labour market. The highest level of agreement was expressed by 54.6% of women (173 out of 317) and 60.8% of men (362 out of 595). A neutral position was adopted by 33.1% of women and 28.1% of men, while disagreement was recorded among a smaller proportion of respondents (12.3% of women; 11.1% of men). The distribution of responses indicates strong support for strengthening the practical orientation of study programmes among both women and men.

**Table 4 Results of the chi-square test: gender and emphasis on practical skills**

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3,420 <sup>a</sup>	2	,181
Likelihood Ratio	3,405	2	,182
Linear-by-Linear Association	2,409	1	,121
N of Valid Cases	912		

Source: SPSS

The statistical evaluation did not demonstrate a significant association between the examined variables,  $\chi^2(2, N = 912) = 3.420, p = 0.181$ . The results therefore do not indicate the existence of gender-based differences in the assessment of the need to revise the content of study programmes towards a greater orientation to practice.

The findings point to a relatively homogeneous perception of this issue within Generation Z, as a high level of agreement with the given statement was observed across both genders. The preference for strengthening the practical component of study thus appears to be a universal requirement that is not determined by respondents' gender.

**Table 5 Gender and importance of cooperation between universities and enterprises**

		Close cooperation between my university and enterprises is important for gaining practical experience			Total
		1	3	5	
Gender women	Count	4	53	260	317
	Expected Count	5,6	52,1	259,3	317,0
men	Count	12	97	486	595
	Expected Count	10,4	97,9	486,7	595,0
Total	Count	16	150	746	912
	Expected Count	16,0	150,0	746,0	912,0

Source: SPSS

Respondents across genders strongly emphasised the importance of close cooperation between universities and enterprises in gaining practical experience. Strong agreement with the stated assertion was expressed by 82.0% of women (260 out of 317) and 81.7% of men (486 out of 595). A neutral position was recorded among 16.7% of women and 16.3% of men, while disagreement occurred only sporadically (1.3% of women; 2.0% of men). The findings indicate a high level of consensus in the evaluation of the importance of cooperation between the academic environment and practice among both genders.

**Table 6 Test statistics**

<b>Chi-Square Tests</b>			
	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	,697 <sup>a</sup>	2	,706
Likelihood Ratio	,734	2	,693
Linear-by-Linear Association	,127	1	,722
N of Valid Cases	912		

Source: SPSS

The results of the analysis did not demonstrate a statistically significant relationship between gender and respondents' attitudes towards the importance of cooperation between universities and practice,  $\chi^2(2, N = 912) = 0.697$ ,  $p = 0.706$ . The findings therefore do not confirm the existence of gender-specific differences in the evaluation of this dimension of labour market preparation. The distribution of responses indicates a high level of consensus across genders, as the majority of respondents consider cooperation between the academic environment and enterprises to be a key factor in acquiring practical experience. This attitude is shared within Generation Z regardless of gender.

The discussion builds on the empirical findings of the study and interprets them in the context of the stated objective and research questions. It focuses on Generation Z's attitudes towards labour market preparation, particularly in the areas of linking theoretical education with practical experience and the importance of cooperation between universities and enterprises. By answering the first research question, it was confirmed that Generation Z perceives the practical orientation of education as a key factor of its labour market readiness. Respondents strongly supported the combination of theoretical and practical instruction, the need to strengthen practical skills, and close cooperation between the academic environment and practice. The second research question was answered negatively, as no statistically significant differences in respondents' attitudes by gender

were demonstrated. The findings suggest homogeneous expectations of Generation Z in the area of labour market preparation.

From a practical perspective, the results point to the need for systematic support of practice-oriented education and strategic cooperation between universities and employers as a prerequisite for the effective integration of Generation Z graduates into the work environment.

#### **4. RESULTS**

The analysis focused on three questionnaire items related to the preparation of Generation Z for the labour market, specifically the evaluation of the effectiveness of teaching that combines theoretical knowledge with practical experience, the need to revise study programmes with an emphasis on practical skills, and the importance of close cooperation between universities and enterprises. The distribution of responses was analysed with regard to respondents' gender.

The results of the descriptive analysis indicate predominantly positive attitudes of Generation Z towards labour market preparation. The majority of respondents expressed a high level of agreement with linking theoretical education with practical experience, supported the need to strengthen the practical orientation of study programmes, and emphasised the importance of cooperation between universities and enterprises in acquiring practical experience. These findings confirm that Generation Z perceives the practical component of education as a key factor in its readiness for the labour market, thereby answering research question RQ1: "What are the attitudes of Generation Z members towards preparation for the labour market, with a focus on linking theoretical education with practical experience?"

To verify differences in respondents' attitudes by gender, the chi-square test of independence was applied. The results of the analysis did not demonstrate statistically significant differences between women and men in any of the examined areas ( $p > 0.05$ ). Generation Z's attitudes towards labour market preparation therefore appear to be consistent regardless of respondents' gender, thus answering research question RQ2: "Are there statistically significant differences in Generation Z's attitudes towards preparation for the labour market depending on respondents' gender?" in the negative.

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## YOUNG PEOPLE NOT IN EMPLOYMENT, EDUCATION OR TRAINING (NEET): DEVELOPMENT, DYNAMICS AND TRENDS IN THE V4 COUNTRIES

*Pavol KUČMIN*<sup>1</sup>

**Abstract:** *Youth unemployment and inactivity among individuals not in employment, education or training (NEET) represent a major risk of social exclusion and long-term "scarring" effects in the labour market. This article aims to provide a comparative analysis of NEET rate developments in the Visegrad Four (V4) countries over the period 2015–2024 and to contrast these patterns with the EU-27 average, focusing on the dynamics of change, the long-term trend, and trend stability. The analysis is based on secondary Eurostat data for the 15–29 age group and applies year-on-year growth coefficients, an average growth coefficient, and a linear trend estimation. The results indicate pronounced year-on-year increases in NEET rates during the COVID-19 pandemic and a long-term downward trend across all analysed countries, particularly in Slovakia and Poland. Trend analysis further reveals differences in stability, with Slovakia exhibiting the highest trend consistency and Czechia the weakest.*

**Key words:** *NEET, youth unemployment, Visegrad Four*

**JEL Classification:** *J64, J13, J68*

### 1. INTRODUCTION

Youth unemployment and social exclusion are currently among the most serious economic and political challenges, adversely affecting not only national economies but also mental health and the future career trajectories of affected individual (Lindblad, Kragholm, et al., 2024; Lindblad, Ravn, et al., 2024; Svabova et al., 2022). In this context, scholarly and policy attention has increasingly focused on the concept of NEET (Not in Employment, Education or Training), referring to young people who are neither employed nor engaged in further education or vocational training (Maynou et al., 2022; Scandurra & Cefalo, 2025). This indicator is widely regarded as a more comprehensive measure of youth vulnerability than the conventional unemployment rate, as it also includes economically inactive individuals who face heightened risks of social exclusion and poverty (Mussida & Sciulli, 2023). Prolonged time spent in NEET status is associated with the so-called scarring effect, whereby early experiences of unemployment negatively affect future wages, employment stability, and overall life satisfaction later in adulthood (Juznik Rotar, 2022; Pastore et al., 2022).

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The literature identifies a broad range of determinants that increase the likelihood of entering NEET status, which can be grouped into individual and contextual factors (Maynou et al., 2022; Youn & Kang, 2023). At the micro level, educational attainment plays a key role: individuals with low qualifications or those who leave education early face several-fold higher risks of social exclusion compared to their tertiary-educated peers (Busse & Maué, 2025; Youn & Kang, 2023). Family background is also important, particularly parents' education and household socio-economic status, which shape access to social capital and influence young people's occupational aspirations (Russell & Thompson, 2025). In addition, research confirms a strong association between adverse health conditions - especially mental health disorders and unsuccessful school-to-work transitions (Grigorescu et al., 2025; Lindblad, Ravn, et al., 2024). At the macro level, NEET rates are affected by business cycles; crises such as the global recession in 2008 or the COVID-19 pandemic in 2020 substantially weakened young people's labour market prospects (Başol et al., 2023; Juznik Rotar, 2022; Mussida & Sciulli, 2023).

European policy responses to these challenges include active labour market policies (ALMPs), notably the Youth Guarantee initiative, which aims to provide young people with a quality offer of employment, continued education, or training shortly after becoming unemployed or leaving formal education (Rocca et al., 2024; Scandurra & Cefalo, 2025). However, policy effectiveness depends on national institutional arrangements and the type of school-to-work transition regime (Petrescu et al., 2025). Some studies suggest that in countries with strong vocational education and training (VET) systems and close links between education and employers' needs, transitions into employment are smoother and NEET rates are lower (Busse & Maué, 2025; Neumeyer & Will, 2024; Schels & Wöhrer, 2022). Career guidance also plays a significant role by helping young people navigate the labour market and reducing the likelihood of suboptimal educational choices (Bálint et al., 2024; Bereményi, 2023).

Within the European Union, the Visegrad Four (V4) countries constitute a specific research area: they share a similar historical experience of economic transformation but currently exhibit different approaches to addressing NEET-related challenges (Maynou et al., 2022; Šiška et al., 2024). In Slovakia, a key instrument supporting graduates' employability is the allowance for school-leaver practice, intended to help young people acquire initial work habits and experience, although ALMP expenditures relative to GDP remain comparatively low compared to the EU average (Svabova et al., 2022; Svabova & Kramarova, 2022). Czechia has long recorded lower NEET rates in international comparison and focuses on institutional support for transitions of pupils with special educational needs and on developing apprenticeship pathways (Svabova et al., 2022;

Šiška et al., 2024). Poland has experienced a substantial decline in youth unemployment over the last decade; nevertheless, research highlights the risk that disadvantaged groups may shift into the informal economy if formal sector opportunities are insufficient (Juznik Rotar, 2022; Tosun et al., 2024). Hungary faces specific challenges related to the social exclusion of Roma youth and an underdeveloped systematic career guidance system, which exacerbates inequalities in access to quality employment (Bereményi, 2023).

Despite existing measures, regional disparities persist within the V4 countries, particularly between urban and rural areas, where young people in peripheral regions face limited access to services and a higher risk of long-term inactivity (Bálint et al., 2024; Grigorescu et al., 2025; Mazzocchi et al., 2024). This article therefore examines the NEET phenomenon in the V4 context, analyses the factors shaping national positions, and assesses the effectiveness of policies adopted in the region to mitigate youth vulnerability. This comparative perspective helps to better understand the dynamics of social exclusion in Central Europe and to identify domains requiring targeted interventions to achieve a more inclusive labour market.

### **1.1 Research questions and analytical framework**

Building on the identified theoretical foundations and empirical evidence on the NEET phenomenon, the article focuses on a comparative analysis of NEET rate development in the Visegrad Four countries over 2015-2024, contrasted with the European Union average (EU-27). The analytical framework is based on longitudinal processing of macro-level data and emphasises year-on-year dynamics, long-term development pace, and the stability of NEET trends over time.

The study is guided by three interrelated research questions. The first focuses on identifying extreme year-on-year changes in NEET rates in the V4 countries and determining the periods in which these changes were concentrated compared with the EU-27 average:

**RQ1:** *What extreme year-on-year changes in NEET rates can be identified in the V4 countries over 2015-2024, and in which periods did they occur?*

The second research question addresses the long-term direction of NEET rate development and compares the pace of change across V4 countries and the EU-27 average:

**RQ2:** *What is the long-term direction of NEET rate development in the V4 countries, and how does the pace of change differ compared to the EU-27 average?*

The third research question evaluates the stability and systematic nature of NEET rate development over time and identifies differences in trend consistency across countries:

**RQ3:** *To what extent does NEET rate development in the V4 countries exhibit a stable long-term trend, and what differences in trend consistency can be identified across countries?*

## 2. PROBLEM STATEMENT AND METHODOLOGY

### 2.1 Data and descriptive statistics

This study is based on secondary quantitative data obtained from Eurostat, an official and internationally harmonised source of labour market statistics for EU countries. Specifically, the analysis uses data from the dataset “Young people neither in employment nor in education and training by labour status (NEET rates)” (dataset code EDAT\_LFSE\_20\$DV\_1101).

The NEET indicator expresses the percentage share of young people who are not employed and at the same time do not participate in formal or non-formal education or training; it is a standardised indicator of youth social and labour market exclusion. Due to the harmonised methodology, this indicator provides a high level of comparability across countries and over time. Data were extracted using the following filters: annual frequency, age group 15–29 years, persons not in employment, and unit of measurement in percent.

The analysis covers 2015-2024, allowing both long-term trends and short-term structural fluctuations related to the COVID-19 pandemic and subsequent post-pandemic labour market adjustment to be captured. The sample includes the V4 countries - Czechia, Hungary, Poland, and Slovakia. The EU-27 average serves as a reference unit to situate V4 developments in a broader European context.

The unit of analysis is a country–year observation, yielding a balanced panel of 50 observations (five units observed over ten years). This data scope is suitable for descriptive and trend analyses enabling comparisons of development dynamics and the identification of distinct trajectories.

**Table 1** provides an overview of NEET rates in the V4 countries and the EU-27 over 2015-2024. The displayed time series serve as a descriptive baseline for comparing levels and dynamics and form the basis for subsequent analysis of year-on-year changes, average development pace, and linear trends.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>European Union - 27 countries</b>	15,2	14,5	13,7	13,1	12,5	13,8	13,1	11,7	11,3	11,1
<b>Czechia</b>	11,8	11,1	10,0	9,5	9,8	11,0	10,9	11,4	10,1	8,6
<b>Hungary</b>	15,1	14,1	13,3	12,8	13,1	14,7	11,7	10,7	10,9	10,9
<b>Poland</b>	14,6	13,8	12,9	12,1	11,4	12,3	13,2	10,7	9,1	9,4
<b>Slovakia</b>	17,2	15,9	16,0	14,6	14,5	15,2	14,2	12,3	11,2	10,7

**Table 1: NEET rate in V4 countries and the EU-27, 2015-2024 (%)**

Source: Eurostat [dataset EDAT\_LFSE\_20\$DV\_1101] (Eurostat, 2025)

## 2.2 Variables and operationalisation

The main variable analysed in this study is the NEET rate, operationalised as the percentage share of individuals aged 15-29 who are not employed and simultaneously not participating in formal or non-formal education or training. As this is an official harmonised Eurostat indicator, the variable is treated as a directly measured statistical indicator rather than a latent construct, ensuring high international comparability.

To capture the dynamics of NEET rates over time and enable cross-country comparisons, several derived indicators were computed from the original values, quantifying year-on-year changes and long-term trends.

### Growth coefficient

The growth coefficient expresses the relative change in the NEET rate between two consecutive periods, enabling identification of the direction and intensity of year-on-year change:

$$k_t = \frac{NEET_t}{NEET_{t-1}}$$

where  $NEET_t$  denotes the NEET rate in year  $t$  and  $NEET_{t-1}$  its value in the preceding year.

### Average growth coefficient (geometric mean)

The average growth coefficient summarises the average pace of NEET rate change over the observation period and provides a synthetic indicator of long-term development. It is calculated as the geometric mean of the year-on-year growth coefficients:

$$\bar{k} = \left( \frac{NEET_n}{NEET_1} \right)^{\frac{1}{n-1}}$$

where  $NEET_1$  and  $NEET_n$  denote the NEET rates in the first and last year of the period and  $n$  is the number of years.

### Linear trend

The linear trend estimates the long-term direction of NEET rate development via a regression model in which time is used as the explanatory variable. The trend coefficient reflects the average annual change in the NEET rate:

$$NEET_t = \alpha + \beta t + \varepsilon_t$$

where  $\alpha$  is the intercept,  $\beta$  the slope,  $t$  a time index, and  $\varepsilon_t$  the error term.

### 2.3 Analytical strategy

The analytical strategy combines descriptive and trend-based procedures to systematically capture the evolution of NEET rates over time and compare their dynamics across the V4 countries and the EU-27 benchmark. The approach reflects both the nature of the available data and the exploratory, comparative aim of the study.

First, the analysis conducted a descriptive assessment of NEET time series for each country using the annual indicator values, enabling identification of baseline levels, year-on-year fluctuations, and periods of elevated volatility.

Second, year-on-year dynamics were examined using growth coefficients to quantify relative annual changes and to compare the intensity of increases or decreases across countries.

Third, an average growth coefficient (geometric mean) was computed for each country as a synthetic indicator of the long-term pace of change, limiting the influence of short-term shocks.

Finally, linear trend analysis was applied to estimate the long-term direction of NEET development; the slope of the trend line was interpreted as the average annual change, facilitating comparisons across countries within a uniform analytical framework.

## 3. RESULTS

### 3.1 Growth coefficients of NEET rates

An analysis of year-on-year growth coefficients provides a detailed view of annual dynamics in the position of young people not in employment, education or training in the V4 countries and the EU-27 average. This indicator identifies periods of the largest increases and decreases, reflecting potential exogenous shocks or significant changes in macroeconomic or institutional settings.

For descriptive purposes, **Table 2** presents the computed year-on-year growth coefficients for the V4 countries and the EU-27 average over the observation period.

**Table 2: Growth coefficients of NEET rates in V4 countries and the EU-27 (2016–2024)**

	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>EU - 27 countries</b>	0,9539	0,9448	0,9562	0,9542	1,104	0,9493	0,8931	0,9658	0,9823
<b>Czechia</b>	0,9407	0,9009	0,95	1,0316	1,1224	0,9909	1,0459	0,886	0,8515
<b>Hungary</b>	0,9338	0,9433	0,9624	1,0234	1,1221	0,7959	0,9145	1,0187	1,
<b>Poland</b>	0,9452	0,9348	0,938	0,9421	1,0789	1,0732	0,8106	0,8505	1,033
<b>Slovakia</b>	0,9244	1,0063	0,9125	0,9932	1,0483	0,9342	0,8662	0,9106	0,9554

Source: Eurostat [dataset EDAT\_LFSE\_20\$DV\_1101], authors' calculations

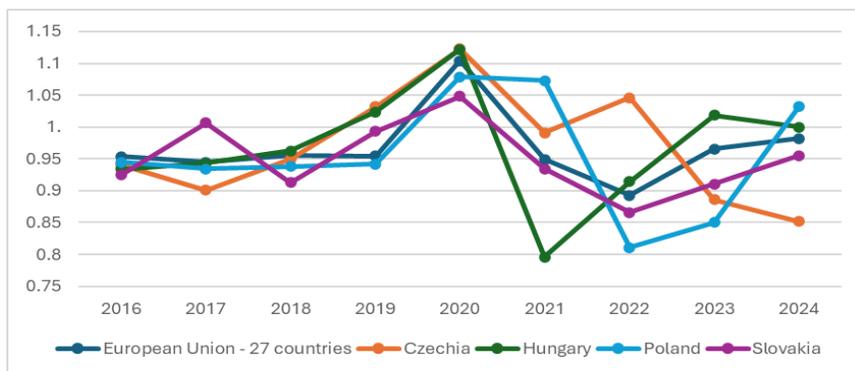
In terms of maximum values, the largest year-on-year increase in NEET rates was observed in Czechia in 2019–2020, with a growth coefficient of 1.1224 (a 12.24 % increase compared to the previous year). A very similar increase occurred in Hungary in the same period (1.1221). Slovakia also recorded an increase in 2019–2020 (1.0483), as did Poland (1.0789). At the EU-27 level, the highest increase likewise occurred in 2019–2020 but with lower intensity (1.1040), suggesting a dampening effect of aggregation.

Conversely, minimum values indicate periods of pronounced decline. The largest decrease was recorded in Hungary in 2020–2021, with a growth coefficient of 0.7959, corresponding to a 20.41 % reduction. A substantial decline was also identified in Poland in 2021–2022 (0.8106). In Slovakia, the largest year-on-year decline occurred in 2021–2022, when the coefficient fell to 0.8662. At the EU-27 level, the lowest growth coefficient also occurred in 2021–2022 (0.8931).

Regarding timing, the largest increases in NEET rates are concentrated during the COVID-19 period (2020), whereas the strongest declines appear immediately thereafter. This pattern suggests a lagged response of labour markets and youth-targeted policies.

To better capture and compare the trajectories of growth coefficients across countries, the development of NEET rates is also illustrated graphically (**Figure 1**).

**Figure 1: Year-on-year growth coefficients of NEET rates in the V4 countries and the EU-27 (2016–2024)**



Source: Eurostat (dataset EDAT\_LFSE\_20\$DV\_1101), authors' processing

The graphical representation confirms the tabular findings. Up to 2019, growth coefficients in all countries clustered around 1, indicating relatively stable NEET development. The year 2020 represents a structural break, characterised by a sharp increase in NEET rates across all analysed units. The subsequent period is marked by heightened volatility and heterogeneous adjustment speeds, with V4 countries exhibiting stronger fluctuations than the EU-27 average.

### 3.2 Average growth coefficient of NEET rates

The average growth coefficient provides a synthetic measure of the long-term pace of change in NEET rates over the observation period. Unlike year-on-year coefficients, which capture short-term volatility, the average growth coefficient reflects the overall direction of development while mitigating the influence of temporary shocks. It is therefore suitable for comparing long-term development across countries with different levels of time-series volatility.

In Slovakia, the average growth coefficient reached 0.949, implying that over the period analysed the share of young people in NEET status decreased on average by approximately 5.1 % per year. This represents the strongest decline among the analysed countries, indicating relatively rapid long-term reduction despite short-term fluctuations. A similar pattern was observed in Poland,

where the average growth coefficient was 0.952, corresponding to an average annual decline of 4.8 %.

Hungary recorded an average growth coefficient of 0.964, indicating an average annual decline of 3.6 %. Czechia reported 0.965, corresponding to an average decline of 3.5 % per year. Both countries thus align more closely with the European average, exhibiting a milder but steady decline.

The EU-27 average reached 0.966, corresponding to an average annual NEET

reduction of 3.4 %. Compared with this benchmark, Slovakia and Poland demonstrate faster long-term decreases, whereas Czechia and Hungary remain close to the EU average.

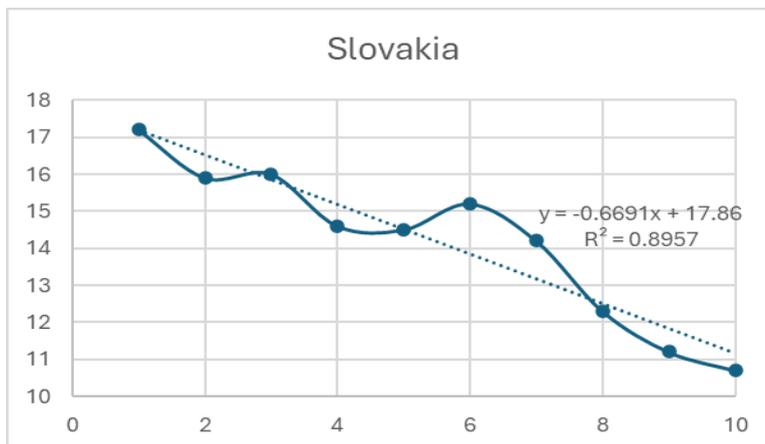
From a comparative perspective, all analysed units recorded average growth coefficients below 1, indicating a long-term decline in NEET rates in both the V4 region and the EU overall. Nevertheless, differences in the pace of decline suggest heterogeneous trajectories that may reflect variations in labour market institutions and the effectiveness of youth integration policies. These differences are examined further through linear trend estimation in the following subsection.

### 3.3 Linear trend in NEET rates

To assess the long-term direction of NEET rate developments in the Visegrad Four (V4) countries and the EU-27 average, a linear trend analysis was applied. Linear trend modelling makes it possible to identify systematic changes in NEET rates over time and to distinguish them from short-term fluctuations driven by cyclical or one-off factors.

#### Slovakia

**Figure 2: Linear trend in the NEET rate in Slovakia (2015-2024)**

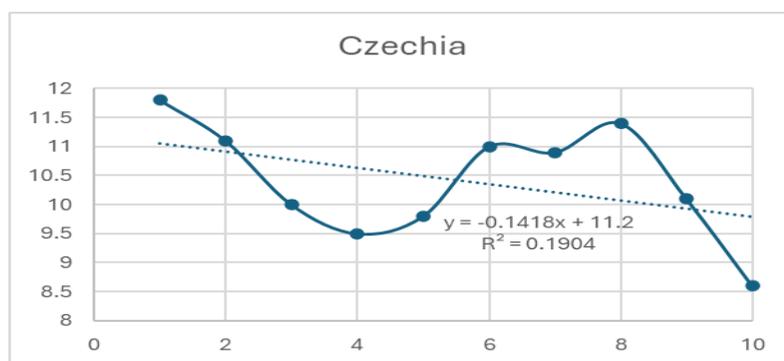


Source: Eurostat (dataset EDAT\_LFSE\_20\$DV\_1101), authors' processing

Based on the linear trend in the NEET rate in Slovakia (Figure 2), a downward trajectory can be observed. The estimated regression coefficient is  $\beta = -0.6691$ , indicating that the NEET rate decreased on average by approximately 0.67 percentage points per year. The coefficient of determination is  $R^2 = 0.8957$ , suggesting that nearly 90 % of the variability in the NEET rate is explained by the linear trend model. The fitted trend equation is  $y = -0.6691x + 17.86$ .

## Czechia

**Figure 3: Linear trend in the NEET rate in Czechia (2015-2024)**

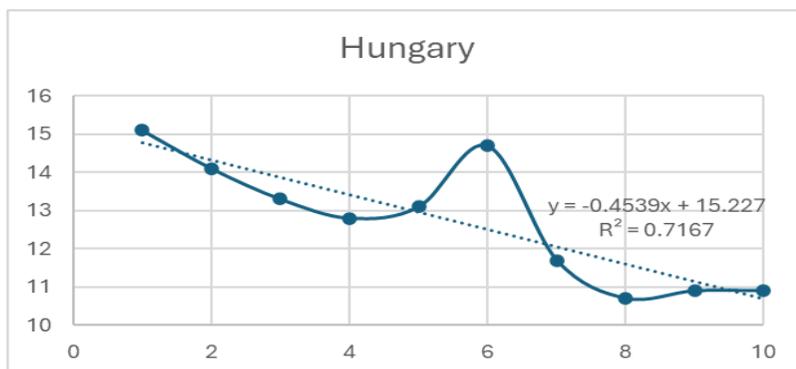


Source: Eurostat (dataset EDAT\_LFSE\_20\$DV\_1101), authors' processing

Based on the linear trend in the NEET rate in Czechia (Figure 3), a slightly declining trend can be identified. The estimated regression coefficient is  $\beta = -0.1418$ . The coefficient of determination  $R^2 = 0.1904$  indicates a low degree of systematic development, as the linear model explains only about 19 % of the variability in the NEET rate. The fitted trend equation is  $y = -0.1418x + 11.2$ .

## Hungary

**Figure 4: Linear trend in the NEET rate in Hungary (2015-2024)**

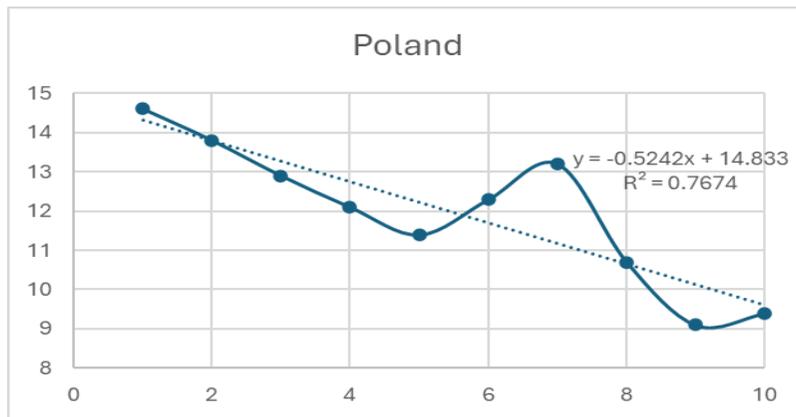


Source: Eurostat (dataset EDAT\_LFSE\_20\$DV\_1101), authors' processing

Based on the linear trend in the NEET rate in Hungary (Figure 4), a declining trend can be observed, with an estimated regression coefficient of  $\beta = -0.4539$ . The coefficient of determination  $R^2 = 0.7167$  points to a relatively high proportion of explained variance. The fitted trend equation is  $y = -0.4539x + 15.227$ .

## Poland

**Figure 5: Linear trend in the NEET rate in Poland (2015-2024)**

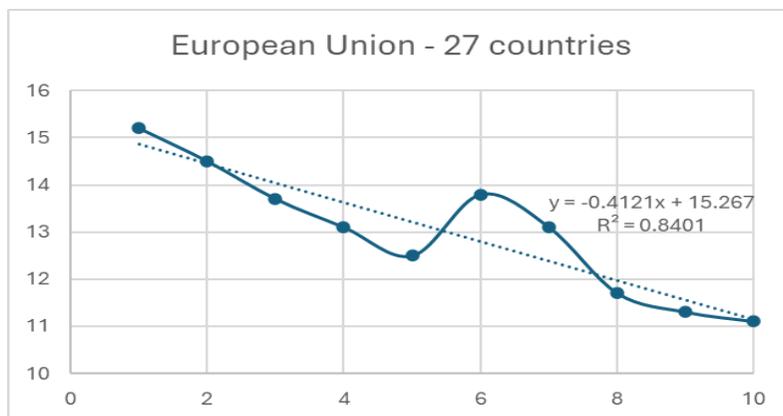


Source: Eurostat (dataset EDAT\_LFSE\_20\$DV\_1101), authors' processing

Based on the linear trend in the NEET rate in Poland (Figure 5), a declining trend can be identified, with an estimated regression coefficient of  $\beta = -0.5242$ . The coefficient of determination  $R^2 = 0.7674$  indicates that the linear model explains approximately 77 % of the variability in the NEET rate. The fitted trend equation is  $y = -0.5242x + 14.833$ .

## European Union (EU-27)

**Figure 6: Linear trend in the NEET rate in EU-27 (2015-2024)**



Source: Eurostat (dataset EDAT\_LFSE\_20\$DV\_1101), authors' processing

Based on the linear trend in the NEET rate in the EU-27 (Figure 6), a declining trend can be observed, with an estimated regression coefficient of  $\beta = -0.4121$ . The coefficient of determination  $R^2 = 0.8401$  indicates a high degree of systematic development. The fitted trend equation is  $y = -0.4121x + 15.267$ .

From a comparative perspective, all analysed units exhibit a declining long-term trend in NEET rates; however, the intensity and stability of this decline differ across countries. The most pronounced and simultaneously most stable decrease was recorded in Slovakia, whereas Czechia shows the lowest trend consistency.

#### **4. CONCLUSION**

The aim of this article was to provide a comparative analysis of NEET rate developments in the Visegrad Four countries over the period 2015–2024 and to compare them with the EU-27 average, with a focus on change dynamics, the long-term pace of development, and trend stability. The results of the descriptive and trend analyses confirm that NEET rate developments in the V4 region were strongly affected by the COVID-19 pandemic, with the largest year-on-year increases concentrated in 2019–2020. The most pronounced year-on-year decline was recorded in Hungary in 2020–2021, indicating a substantial post-pandemic correction in that country.

Average growth coefficients were below 1 in all analysed units, indicating a long-term decline in NEET rates in both the V4 countries and the EU-27 average. The fastest pace of decline was identified in the Slovakia and Poland, while Czechia and Hungary approximated the European average in terms of long-term change. Linear trend analysis confirmed a downward direction of development across all units, but with differing degrees of trend consistency. Slovakia exhibited the most stable trend (highest  $R^2$ ), whereas Czechia was characterised by low trend stability, pointing to a higher degree of short-term volatility over the observed period.

With respect to the research questions, the results show that extreme year-on-year changes in NEET rates in the V4 countries were strongly concentrated during the COVID-19 period, confirming the high sensitivity of young people's labour market position to external macroeconomic shocks. At the same time, despite these fluctuations, NEET rates in the V4 countries display a predominantly downward long-term trajectory, albeit with differing pace and stability across countries. These findings support the existence of heterogeneous development trajectories within the V4 region and highlight the importance of national institutional frameworks and policy approaches.

From a practical perspective, the results suggest the need for differentiated strategies to address the NEET phenomenon in the V4 region. In particular, strengthening support for school-to-work transitions through high-quality active labour market programmes, accessible career guidance, and targeted interventions for vulnerable youth groups appears essential. A key limitation of the study is the use of aggregated macro-level data, which do not allow testing micro-level causal mechanisms or directly evaluating the effectiveness of individual policy instruments. Future research should therefore combine macro-comparative approaches with micro-level data and explicitly account for heterogeneity among NEET subgroups and regional disparities within the V4 countries.

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## UNDERSTANDING QUIET QUITTING AMONG GENERATION Z IN CONTEMPORARY WORK ENVIRONMENTS

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**Abstract:** *Quiet quitting has emerged as a contemporary phenomenon describing psychological and behavioral withdrawal from work without formal resignation. Existing research links the concept to burnout, well-being, and turnover intention, particularly among Generation Z employees navigating changing workplace expectations. However, empirical studies rarely focus on working students who simultaneously balance academic and employment demands, and pilot validations of measurement tools in this hybrid context remain limited. The aim of this pilot study was to examine the presence of quiet quitting tendencies among working Generation Z university students and to assess the applicability of a two-dimensional measurement scale capturing behavioral and emotional disengagement. The sample consisted of 32 working students from Alexander Dubček University of Trenčín. Data were collected using a structured questionnaire with a 5-point Likert scale and analyzed through descriptive statistics, reliability analysis, histograms, and heatmap visualization. Results indicate measurable quiet quitting tendencies in both dimensions, with emotional disengagement slightly exceeding behavioral disengagement. The scale demonstrated satisfactory internal consistency ( $\alpha = .83$ ) and adequate response variability, supporting its suitability for future research. The findings suggest that quiet quitting may first emerge at the emotional level and represent an early adjustment strategy rather than extreme withdrawal. Although exploratory, the study contributes to clearer operationalization of quiet quitting and highlights early disengagement patterns relevant to organizations employing young workers. The pilot provides an empirical foundation for larger and more diverse investigations of Generation Z in contemporary work environments.*

**Key words:** *quiet quitting, Gen-Z, work environments*

**JEL Classification:** *J-19, J-21, J-24,*

### 1. INTRODUCTION

Quiet quitting has become established in recent years as a label for behavior in which employees deliberately limit their work effort to the

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“minimum required” without formally resigning, with the core consisting of mental disengagement, reduced initiative, and refusal of above-and-beyond tasks (Bordoloi et al., 2025; Atiq et al., 2025; Bernuzzi et al., 2025). The conceptual anchoring of the phenomenon has been developing gradually in the literature, and a scoping review emphasizes that definitions vary, yet repeatedly feature motives of minimal effort, the absence of formal resignation, a preference for work–life balance, disengagement, and coping with stress (Bernuzzi et al., 2025). A systematic review also notes that existing research is fragmented across management sub-domains and industries, motivating the use of integrative frameworks that connect antecedents, internal processes, and outcomes of quiet quitting (Bordoloi et al., 2025). Integrative reviews further caution that quiet quitting gained prominence in the post-pandemic period and highlight the need for conceptual clarity and coherent theoretical development (Bernuzzi et al., 2025; Kachhap & Singh, 2024). An integrative review applying multiple psychological and management frameworks identifies contributors such as economic downturns, the COVID-19 pandemic, and rapid technological advancement, and highlights HR strategies including mental health support, flexible work arrangements, recognition practices, career development, and purpose-driven culture (Atiq et al., 2025).

In relation to Generation Z, quiet quitting is interpreted as a form of disengagement and discussed in relation to shifts in how this cohort approaches work and workplace attachment (Moczyłowska, 2024; Ochis, 2024). A qualitative study conceptualizes quiet quitting as a form of Kahn’s disengagement and as part of Generation Z’s exit–voice–loyalty–neglect dynamics, reporting that the lifecycle of Generation Z employees in organizations is approximately one year. The study compares perspectives of Gen Z employees and their managers, classifies Gen Z engagement phases, and introduces an integration framework for Gen Z within companies that takes the employee lifecycle into account (Ochis, 2024). A managerial-perspective study reports that managers perceive quiet quitting among Gen Z as significant and describes indicators such as low attachment to the workplace, low emotional involvement, and reduced perception of work as an important life value. It groups potential causes into psychological, social, economic, and managerial categories and interprets the issue through a human-centric management paradigm (Moczyłowska, 2024).

Empirical quantitative studies in Gen Z samples provide detail on organizational conditions associated with quiet quitting intention and on the mediating role of burnout and well-being (Xueyun et al., 2023; Nguyen & Vu, 2025). A large Chinese Gen Z study finds that work conditions, job security, perceived career progression opportunities, affective organizational commitment, and perceived organizational

support positively affect employee well-being, while job burnout negatively affects well-being. It further reports that well-being is negatively associated with quiet quitting decisions and that burnout is positively associated with quiet quitting decisions, situating these findings within Social Exchange Theory (Xueyun et al., 2023). A Vietnamese Gen Z study reports that work–life balance, affective organizational commitment, and perceived organizational support influence quiet quitting intention through the mediating effect of job burnout, while a toxic workplace environment has a direct effect. The model is grounded in Conservation of Resources Theory, Social Exchange Theory, and Theory of Generations (Nguyen & Vu, 2025).

From the perspective of work stress and adverse conditions, Gen Z quiet quitting is examined in relation to toxic workplace environment and job insecurity, as well as moderators that may weaken these relationships (Azizah et al., 2025; Nguyen & Vu, 2025). A study from the Indonesian financial sector reports that toxic work environment and job insecurity have positive effects on quiet quitting. It finds that organizational career growth and grit weaken the effect of toxic work environment on quiet quitting but do not significantly moderate the effect of job insecurity, positioning these findings within Conservation of Resources Theory (Azizah et al., 2025).

Workplace hazing is also examined as a Gen Z-specific stressor. A hotel-industry study reports that workplace hazing leads to quiet quitting intentions through moral injury and defensive silence, and that authentic leadership does not moderate the relationship between moral injury and defensive silence. The authors emphasize the importance of regulating workplace hazing to mitigate Gen Z quiet quitting inclination (Srivastava & Saxena, 2025).

Quiet quitting is linked to work attitudes associated with retention, particularly job satisfaction and workload (Taufik et al., 2024). A study of millennial and Gen Z workers reports that job satisfaction negatively affects quiet quitting behavior. It also finds that empowering leadership and organizational culture positively influence job satisfaction, while work overload negatively influences job satisfaction (Taufik et al., 2024). A viewpoint focused on Asian businesses connects quiet quitting concerns to post-COVID changes in work and associated psychological stresses, arguing for greater autonomy in work performance and reconsideration of employment contracts (Campton et al., 2023).

A systematic review focused on Generation Z reports that quiet quitting can function both as a coping mechanism against stress and work–life imbalance and as an indicator of disengagement that exacerbates work anxiety. It identifies excessive workload, high organizational expectations, and weak social support as reinforcing this link (Oktavia et al., 2025). At a

broader level, a scoping review identifies occupational health factors, job and personal resources, work attitudes, behaviors, and risk factors as predictors of quiet quitting, and highlights well-being, burnout, and job satisfaction as important mediators within its nomological network (Bernuzzi et al., 2025).

The operationalization and measurement of quiet quitting are addressed through several scale-development studies (Galanis et al., 2023; Patel et al., 2025; Karrani et al., 2024; Anand et al., 2024). One study develops and validates a three-factor Quiet Quitting Scale consisting of detachment, lack of initiative, and lack of motivation, demonstrating concurrent validity through correlations with job satisfaction, burnout, and turnover intention (Galanis et al., 2023). Another study develops and validates a two-dimensional quiet quitting scale across multiple samples to enable more nuanced examination of correlates and consequences (Patel et al., 2025). A further study develops and validates parallel scales for quiet quitting and quiet firing, reporting good psychometric properties (Anand et al., 2024). In addition, a service-organization study conceptualizes and validates a unidimensional quiet quitting behaviours scale and reports associations with disengagement, dissatisfaction, job stress, and work alienation (Karrani et al., 2024).

Turnover intention is repeatedly identified as an important outcome associated with quiet quitting (Bernuzzi et al., 2025; Galanis et al., 2024). A scoping review identifies turnover intention as a primary outcome linked to quiet quitting and notes that most existing studies rely on cross-sectional designs, highlighting the need for longitudinal research (Bernuzzi et al., 2025). A healthcare study reports that higher levels of quiet quitting increase turnover intention among nurses. Another study in the same context finds that workload is associated with higher quiet quitting, higher turnover intention, and higher job burnout (Galanis et al., 2024; Galanis et al., 2025).

Socio-technical perspectives examine quiet quitting as emerging from combinations of IS-induced depletion, boreout syndrome, social media usage, and digital cohort status. Across a two-wave design and two studies, IS-induced depletion and boreout are identified as key predictors, and digital immigrants are found to be more susceptible under certain configurations (Abubakar et al., 2025).

Generational analyses position quiet quitting as a mediating mechanism between workplace antecedents and turnover intention, with effects differing across cohorts. A study reports partial mediation for dissatisfaction in Gen Y and full mediation in Gen Z for relationships involving negative extra-role behavior and cynicism or depersonalization. It also reports partial mediation for negative work–life balance across generations (Roedenbeck et al., 2025). In combination with qualitative

evidence describing a one-year organizational lifecycle for Gen Z employees, these findings situate quiet quitting within generational engagement and turnover dynamics (Ochis, 2024; Roedenbeck et al., 2025).

Integrative models such as SOR and SOR-C conceptualize quiet quitting behaviors as responses to organizational stimuli shaped by cognitive and emotional processes and connected to consequences at multiple levels (Bordoloi et al., 2025). This integrative logic aligns with Gen Z empirical models that examine burnout and well-being as mediators linking organizational conditions to quiet quitting intention (Xueyun et al., 2023; Nguyen & Vu, 2025). Overall, quiet quitting emerges as a multi-level phenomenon connected to work conditions, employee states, measurement approaches, and outcomes such as turnover intention. The literature also highlights methodological limitations, particularly the predominance of cross-sectional designs, and underscores the value of further longitudinal research (Bernuzzi et al., 2025).

## **2. PROBLEM FORMULATION AND METHODOLOGY**

Despite growing interest in quiet quitting, empirical research focusing on working Generation Z students remains limited. Existing studies highlight the need for clearer measurement of behavioral and emotional disengagement in specific social contexts. It is unclear to what extent quiet quitting is already present among young individuals balancing academic and work responsibilities. Pilot testing of measurement instruments is therefore necessary before broader investigation. The present study addresses this gap by examining quiet quitting tendencies in a sample of working Generation Z university students.

The aim of this pilot study was to explore the presence of quiet quitting tendencies among Generation Z working students and to assess the applicability of a measurement instrument capturing behavioral and emotional dimensions of disengagement in contemporary work environments. The pilot phase focused on verifying the usability, clarity, and internal consistency of the scale prior to a larger study. The pilot study was guided by research question: To what extent are behavioral and emotional indicators of quiet quitting present among working Generation Z university students?

The instrument captured two conceptual dimensions (behavioral and emotional). The questionnaire consisted of 20 items. Respondents evaluated each statement on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Quiet quitting was measured using a structured questionnaire adapted from an existing scale (Patel et al. 2025).

**Table 1: List of items and coding of items**

Item	Statement	Dimensi	Coding /
B1	I do only the work I'm specifically asked to do; just enough to	Behavior	1-5
B2	I spend the adequate time necessary working on tasks to keep my	Behavior	1-5
B3	By doing just enough to keep my job, I am okay foregoing future	Behavior	1-5
B4	I do not do extra work beyond what I'm paid to do.	Behavior	1-5
B5	I prefer not to return emails/calls on holidays and vacations.	Behavior	1-5
B6	I try to maintain a strict boundary between work and my life	Behavior	1-5
B7	I don't look for extra work to do even though it could help me get	Behavior	1-5
B8	I take active steps at work to reduce the job as part of my identity.	Behavior	1-5
B9	I believe in working just enough, not harder or smarter.	Behavior	1-5
B10	Doing only the required work is smart, not lazy.	Behavior	1-5
E1	It negatively affects my mood when I do more work for the same	Emotion	1-5
E2	I feel guilty doing only the minimum amount of work necessary	Emotion	1-5
E3	It doesn't bother me when extra work gets left unfinished.	Emotion	1-5
E4	It is emotionally rewarding for me not looking for extra work to	Emotion	1-5
E5	Worries weigh heavily on my mind when going above and	Emotion	1-5
E6	My emotions multiply negatively when working beyond what is	Emotion	1-5
E7	I feel less burned out by doing only the work that is needed.	Emotion	1-5
E8	My mental health is better by not going the "extra mile" at work.	Emotion	1-5
E9	I don't tend to spend time mulling over work-related issues.	Emotion	1-5
E10	Thinking about work only enough to keep my job improves my	Emotion	1-5

Source: (Patel et al. 2025)

The research sample consisted of 32 working students enrolled at Alexander Dubček University of Trenčín. Participants belonged to Generation Z and were simultaneously engaged in paid employment while studying. The sampling was convenience-based and participation was voluntary. The pilot character of the study aimed at preliminary testing of the instrument rather than generalization to the broader population.

Data were analyzed using SPSS, including reliability testing with Cronbach's alpha, descriptive statistics, and histogram visualization, while the heatmap was generated in R.

As a pilot investigation, the study has several limitations. The small sample size (n=32) limits statistical generalization and reflects exploratory rather than confirmatory intent. The convenience sampling of university students may not represent the broader Generation Z workforce. Additionally, self-report data are subject to subjective interpretation and social desirability bias. Despite these limitations, the pilot provided valuable preliminary insights into the structure and applicability of the quiet quitting scale.

### 3. PROBLEM SOLUTION / RESULTS / DISCUSSION

Table 2 presents descriptive statistics for the behavioral and emotional dimensions of quiet quitting. Both variables were measured without missing data (N=32). The behavioral dimension reached a mean score of

M=3.02 (SD=0.64), while the emotional dimension showed a slightly higher average of M=3.29 (SD=0.70).

**Table 2: Descriptive statistics**

<b>Statistic</b>	<b>Behavioral</b>	<b>Emotional</b>
N Valid	32	32
N Missing	0	0
Mean	3,022	3,291
Median	2,9	3,45
Std. Deviation	0,6369	0,7004
Skewness	0,049	-0,867
Std. Error of Skewness	0,414	0,414
Kurtosis	-0,503	0,563
Std. Error of Kurtosis	0,809	0,809
Minimum	1,7	1,3
Maximum	4,3	4,4

Source: author's calculations (SPSS)

The observed range indicates sufficient variability in responses (behavioral: 1.7–4.3; emotional: 1.3–4.4). Skewness and kurtosis values remain within acceptable limits, suggesting no severe departure from normal distribution (Hair et al. 2022). This indicates that the pilot data are suitable for further analysis.

Internal consistency of the combined quiet quitting measure was high, with Cronbach's alpha  $\alpha=0.83$ .

**Table 3: Reliability statistics**

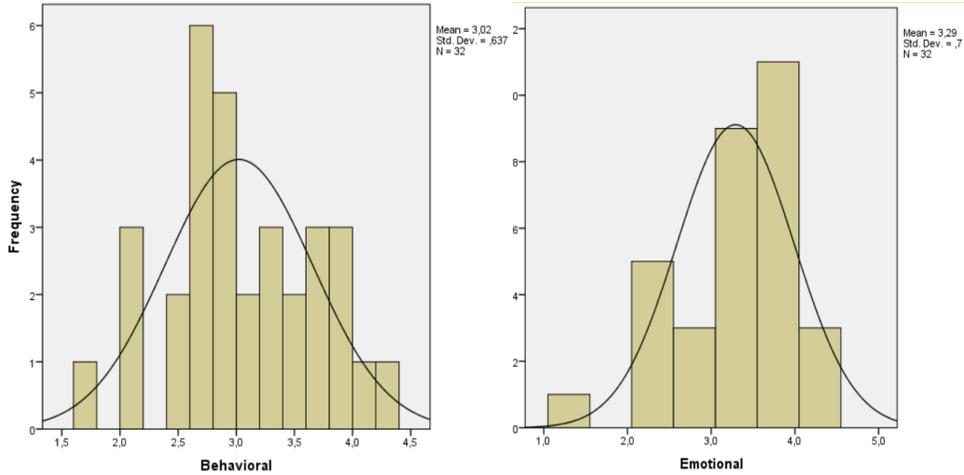
<b>Statistic</b>	<b>Value</b>
Cronbach's Alpha	0,827
Cronbach's Alpha Based on Standardized	0,829
N of Items	2

Source: author's calculations (SPSS)

This value exceeds the commonly accepted threshold of .70 for exploratory research (Hair et al. 2022) indicating satisfactory reliability of the pilot instrument.

Histograms for both dimensions show approximately normal distributions without extreme values. Responses are spread across the scale, indicating sufficient variability in both behavioral and emotional dimensions. The emotional dimension is slightly shifted toward higher scores, suggesting somewhat stronger emotional disengagement.

**Figure 1: Histogram**

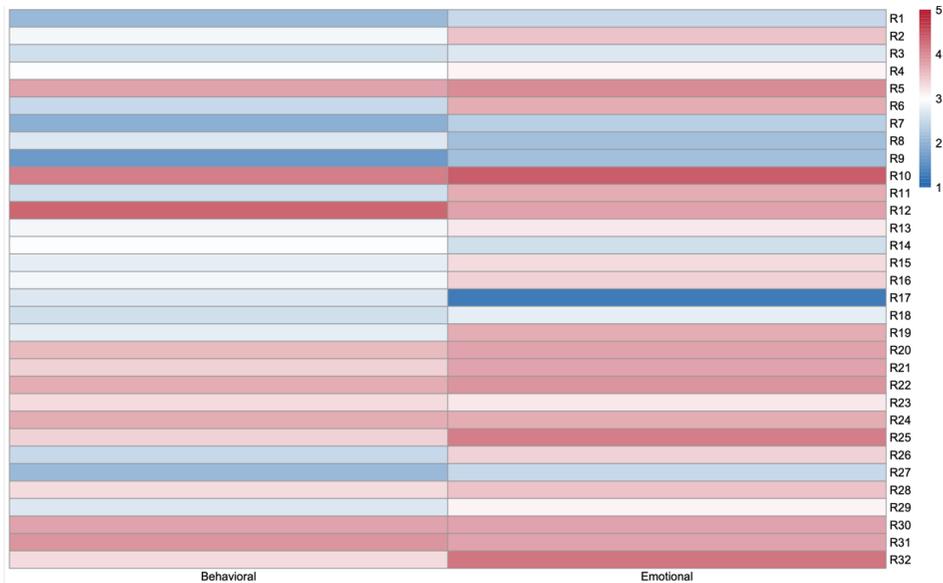


Source: author's calculations (SPSS)

No strong floor or ceiling effects were observed, which supports the usability of the measurement scale (Nguyen et al. 2020).

Average scores reveal that emotional quiet quitting tendencies are slightly stronger than behavioral tendencies in the sample. While both dimensions cluster around the midpoint of the scale, the emotional dimension demonstrates a higher central tendency. This suggests that disengagement may emerge emotionally before being fully expressed behaviorally.

**Figure 2: Heatmap**



Source: author's calculations (R)

The heatmap illustrates individual response patterns across respondents. Visual inspection confirms heterogeneous engagement profiles, indicating

that quiet quitting is not uniformly distributed but varies across individuals. The visualization supports the exploratory aim of the pilot study by highlighting variability in behavioral and emotional responses.

The pilot findings align with prior literature suggesting that quiet quitting among Generation Z is closely connected to emotional disengagement processes. The slightly higher emotional scores observed in our sample correspond with research emphasizing burnout, well-being, and psychological withdrawal as early indicators of quiet quitting behavior (Xueyun et al., 2023; Nguyen & Vu, 2025). Similar to the generational perspective described by Moczydłowska (2024) the results suggest that disengagement among young workers may first manifest internally before becoming visible through reduced behavioral effort. The heterogeneity observed in the heatmap further supports the argument that quiet quitting is not a uniform phenomenon but varies across individuals depending on workplace and psychological conditions, which is consistent with integrative models highlighting multi-level influences (Bordoloi et al., 2025; Bernuzzi et al., 2025). While the pilot nature of the study prevents generalization, the detected emotional predominance mirrors international findings that position quiet quitting as a coping response to stress and work-life imbalance (Oktavia et al., 2025), reinforcing the relevance of early measurement among Generation Z populations.

#### **4. CONCLUSION**

The aim of the pilot study was to examine the presence of quiet quitting tendencies among working Generation Z students and to test the applicability of a structured measurement scale capturing behavioral and emotional disengagement. Using a questionnaire-based pilot design, the study analyzed responses from 32 working university students. In the pilot study was used descriptive statistics, reliability testing, histograms and heatmap through the R software. The findings demonstrate that quiet quitting is observable and measurable within this population, with emotional disengagement appearing slightly more pronounced than behavioral disengagement. The scale showed satisfactory internal consistency and adequate variability, supporting its usability in future research. From a scientific perspective, the study contributes to the growing body of research seeking clearer operationalization of quiet quitting and extends investigation into the underexplored context of working students. From a practical perspective, the findings highlight early disengagement patterns that organizations and educational institutions should recognize when supporting young employees balancing work and study. The pilot nature of the study and small convenience sample limit generalization. Future research should involve larger and more diverse samples, longitudinal designs, and examination of contextual

workplace factors. Despite these limitations, the study provides an empirical foundation for continued investigation of quiet quitting among Generation Z.

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## **FLEXIBILITY, SECURITY AND WORK–LIFE BALANCE: HOW GENERATION Z DEFINES AN IDEAL JOB**

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**Abstract:** *The paper analyses how Generation Z and older cohorts perceive key employment values such as flexibility, job security, and work–life balance. The study draws on data from a Czech online survey (N = 455) conducted in spring 2025. Generation Z shows stronger preference for flexibility, autonomy, and well-being, while older respondents emphasise financial and job security. Younger participants also link satisfaction with freedom and purpose rather than long-term stability. The findings highlight shifting work expectations among younger employees and underline the need for employers to balance flexibility with stability and trust.*

**Keywords:** *Generation Z, work values, flexibility, job security, work–life balance.*

**JEL Classification:** *J22; J28; J24; M54; C83*

### **1. INTRODUCTION**

Over the past decade, the entry of Generation Z into the global labour market has attracted growing academic and managerial attention. Born roughly between 1996 and 2010, this cohort represents the first generation of digital natives—individuals whose personal, educational, and social development has been shaped by continuous access to the internet, smartphones, and social media (Benítez-Márquez et al., 2022). Their formative years coincided with major global disruptions including the 2008 financial crisis, the COVID-19 pandemic, and the recent cost-of-living crisis. Consequently, their attitudes towards work reflect both optimism about technological opportunities and caution regarding job security and well-being (Rudolph & Zacher, 2020; Deloitte, 2025).

Although researchers caution against simplistic generational stereotypes, consistent patterns are visible across countries. Studies reveal that Generation Z tends to emphasise intrinsic and developmental work values such as purpose, autonomy, and learning, while also maintaining

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pragmatic concern for stability and fair pay (Barhate & Dirani, 2022; de Boer et al., 2021). Global reports confirm that flexibility, work–life balance, and mental health are key determinants of job satisfaction among young employees (Gallup, 2024; Eurofound, 2022). At the same time, high economic uncertainty encourages this cohort to seek predictable employment conditions and transparent organisational cultures (OECD, 2023).

These shifts challenge employers to rethink traditional HR practices. Hybrid and remote work models, once considered temporary solutions, have become structural expectations among young professionals who associate autonomy with trust and engagement (CIPD, 2023). Yet the increased fluidity of modern work also exposes new tensions: constant connectivity, blurred boundaries, and performance pressure can threaten well-being if organisational policies remain outdated (Eurofound, 2022; Waworuntu et al., 2022).

Understanding how Generation Z balances the desire for flexibility, autonomy, and security is therefore essential for sustainable human-resource management. This study contributes to the ongoing discussion by examining value priorities and work perceptions among different age groups within a recent empirical survey. By comparing Generation Z with older cohorts, the paper seeks to identify shared and divergent expectations shaping contemporary work dynamics.

## **2. PROBLEM FORMULATION**

Research across contexts shows that Generation Z prioritises intrinsic and developmental work values—learning, growth, and meaning—over hierarchical advancement, while still valuing fair pay and stability (de Boer et al., 2021; Barhate & Dirani, 2022). Success is increasingly defined through authenticity and self-development, reflecting the digital transformation and ethical expectations shaping modern workplaces (Benítez-Márquez et al., 2022).

Central-European studies confirm that Czech and Slovak respondents emphasise benevolence and pro-social motivation rather than transactional aims (Dokoupilová, 2024). Digitalisation has further reshaped employability and career identity, reinforcing expectations of autonomy and lifelong learning (OECD, 2023). Overall, Gen Z adopts a value-driven and relational psychological contract with employers, focused on trust, learning, and well-being (Rudolph & Zacher, 2020).

**Flexibility and autonomy** have become defining features of Gen Z's employment expectations. Post-pandemic hybrid models transformed flexibility from a benefit to a basic condition of job quality (Eurofound, 2022). Research shows it enhances satisfaction, engagement, and

performance when accompanied by managerial trust (Pradipta et al., 2025; CIPD, 2023; Rudolph & Zacher, 2020). Flexible options signal respect and empowerment, yet without boundary clarity they may increase stress (Eurofound, 2022). Effective models therefore rely on trust-based leadership and transparent workload expectations (Barhate & Dirani, 2022).

Although associated with a desire for freedom, Generation Z continues to view **financial security** as fundamental. Economic uncertainty and rising living costs have fostered ambivalence—valuing flexibility but demanding predictability (Gallup, 2024; McKinsey & Company, 2024). Older cohorts traditionally link security to tenure, whereas Gen Z accepts short-term work if fairness and development are ensured (Rudolph & Zacher, 2020). In the Deloitte (2025) global survey, 70 % of Gen Z cited financial stress as dominant but favoured balance and supportive culture over income maximisation. Scholars describe this as bounded risk-taking: uncertainty is tolerated when trust and integrity are present (Barhate & Dirani, 2022). OECD (2023) findings confirm that precarity strengthens demands for stability and social protection.

**Work–life balance (WLB)** has become a central employment value rather than a secondary one. For Gen Z, balance means aligning work with psychological health and self-expression (Waworuntu, Mandagi & Pangemanan, 2022). It ranks alongside flexibility and salary fairness as a predictor of satisfaction (Rachmadini & Riyanto, 2020). Global data show increasing stress and mental-health concern among young workers (Gallup, 2024; Deloitte, 2025). When organisations support autonomy and manageable workloads, engagement rises (Barhate & Dirani, 2022). Yet blurred boundaries in telework can undermine well-being unless expectations are explicit (Eurofound, 2022). For Gen Z, WLB is a non-negotiable indicator of job quality and meaningful work.

Comparative studies highlight both continuity and change. While Millennials and Generation X also value meaning and flexibility, Gen Z articulates these preferences more strongly and links them to identity and mental health (Rudolph & Zacher, 2020; Barhate & Dirani, 2022). They resist long hours and rigid hierarchies, demanding inclusivity and social responsibility (McKinsey & Company, 2024). A bibliometric review identifies three recurring dimensions of generational difference: digital adaptability, flexibility and boundary management, and ethical awareness (Benítez-Márquez et al., 2022). Central-European research adds that younger cohorts emphasise benevolence and creativity, whereas older workers prioritise stability and procedural fairness (Dokoupilová, 2024). Altogether, Generation Z represents both continuity and catalyst—retaining aspirations for fairness and security while redefining them through flexibility, balance, and self-determination (Rudolph et al., 2021).

### 3. METHODOLOGY

This paper employed a **quantitative survey design** to examine and compare work-related values and attitudes across generational cohorts, with a particular focus on Generation Z. The main objective was to identify differences in perceptions of flexibility, job security, and work–life balance between younger and older employees. A structured online questionnaire was designed using *Google Forms* and distributed during **March–April 2025**. Participation was voluntary and anonymous, and all respondents were informed about the purpose of the study before completing the survey.

A total of **455 respondents** participated in the research. The sample represented various employment sectors, including public administration, education, private business, and services. Respondents were divided into two generational categories:

- **Generation Z** (*born 1996–2010; n ≈ 240; 52.7 %*), and
- **Older cohorts** (*born before 1996; n ≈ 215; 47.3 %*).

The gender distribution was balanced (approximately 54 % female, 45 % male, 1 % other/prefer not to say). This composition enabled a **comparative analysis** of intergenerational differences in work-related preferences and attitudes.

The questionnaire consisted of **5 closed-ended questions**:

**Q1: What form of income do you prefer?** - respondents chose between stable employment with fixed pay, a mix of employment and personal projects, or a fully flexible income model.

**Q2: How important is flexibility in your working hours?** - measured the degree to which participants prioritised control over their own working hours.

**Q3: How would you describe your financial behaviour and attitude towards spending?** - explored whether respondents identified more with saving, careful spending, or living day-to-day.

**Q4: Which factors are most important for you when choosing a job?** - asked which factors were most decisive when choosing a job, such as salary level, job security, flexibility, professional growth, and self-realisation.

**Q5: Would you prefer a stable and secure income, or a higher but uncertain one?** - examined whether individuals prefer stable income or are willing to trade security for higher, uncertain earnings.

As the paper relied on self-administered online data collection, results may reflect self-selection bias and subjective perceptions. Nonetheless, the balanced composition of age groups and the overall sample size provide a strong basis for intergenerational comparison and for identifying key trends in workforce expectations.

#### 4. RESULTS AND DISCUSSION

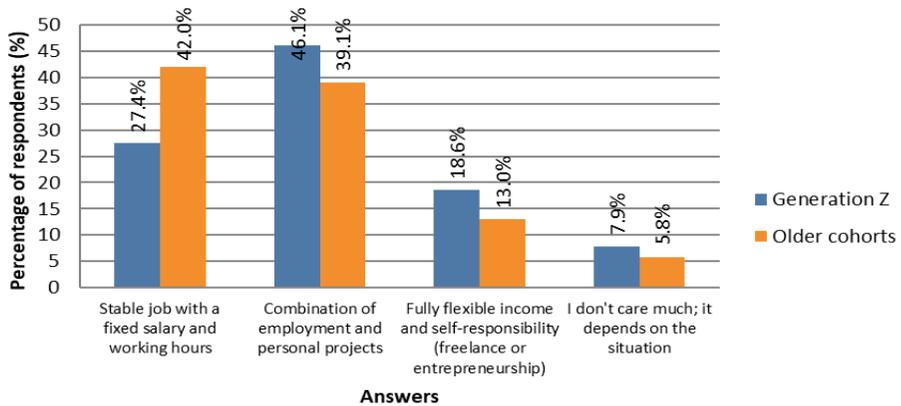
The analysis identifies clear generational differences in attitudes toward income, work flexibility, financial behaviour, job priorities, and risk tolerance. The dataset distinguishes between Generation Z (aged  $\leq 28$ ) and older cohorts (29+). Overall, the findings confirm that younger respondents emphasise autonomy, adaptability, and personal well-being, whereas older participants prioritise financial stability and job security.

##### 4.1 Findings of the conducted analysis

Generation Z shows a strong preference for combining employment with personal projects, reflecting the rise of hybrid income models and a search for creative autonomy. Older cohorts, by contrast, prefer stable full-time employment with predictable hours, highlighting a continued orientation toward security. This pattern aligns with prior research indicating that Gen Z connects job satisfaction with self-realisation and flexibility rather than long-term tenure (Barhate & Dirani, 2022; Rudolph & Zacher, 2020).

**Figure 1** illustrates this contrast, showing differing priorities of stability and flexibility between the two groups.

**Figure 1: Answers to Q1 - What form of income do you prefer?**

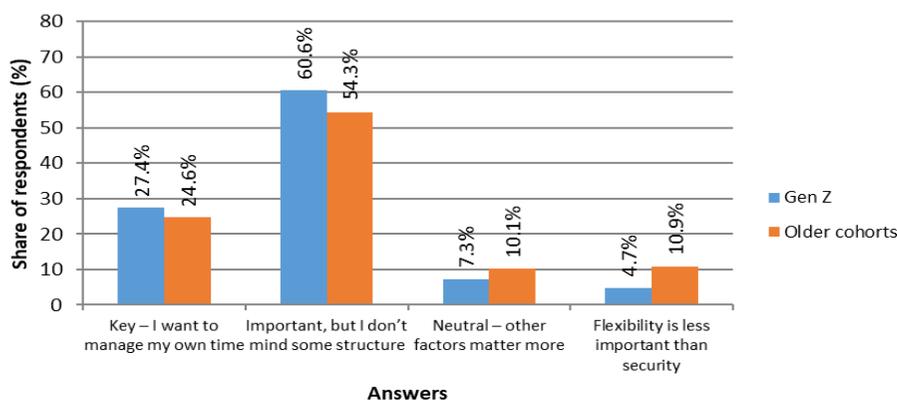


Source: own elaboration

Flexibility in working hours emerged as a defining factor for younger respondents. For Gen Z, control over time is a core condition of

satisfaction and psychological well-being, while older participants treat it as beneficial but secondary. These results mirror earlier studies linking flexibility with empowerment and trust (Eurofound, 2022; CIPD, 2023). The pattern visible in **Figure 2** confirms that Generation Z associates flexible scheduling with independence and self-realisation, while older cohorts interpret it more pragmatically, balancing freedom with organisational order.

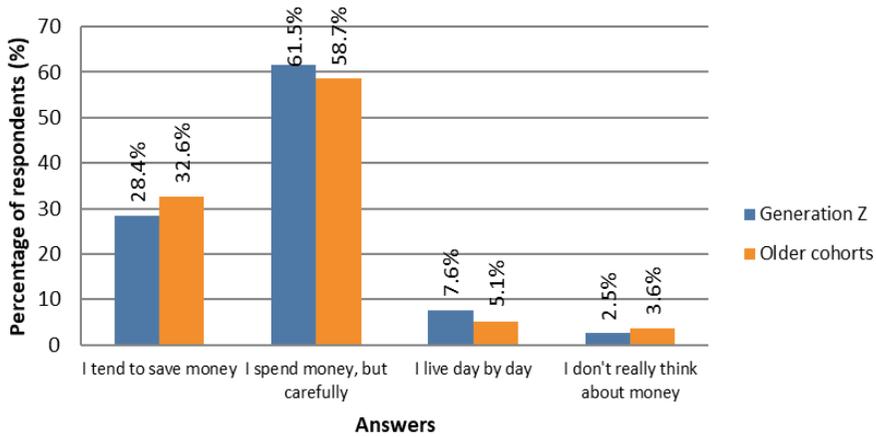
**Figure 2: Answers to Q2 - How important is flexibility in your working hours?**



Source: own elaboration

Regarding financial behaviour, both groups display cautious spending, yet Gen Z is slightly more willing to balance consumption with savings, whereas older respondents report stronger saving habits. This finding supports previous evidence that younger adults navigate financial uncertainty with adaptive, short-term strategies (OECD, 2023; Gallup, 2024). The distribution of responses in **Figure 3** shows how financial prudence is shared across generations, though expressed with different emphases.

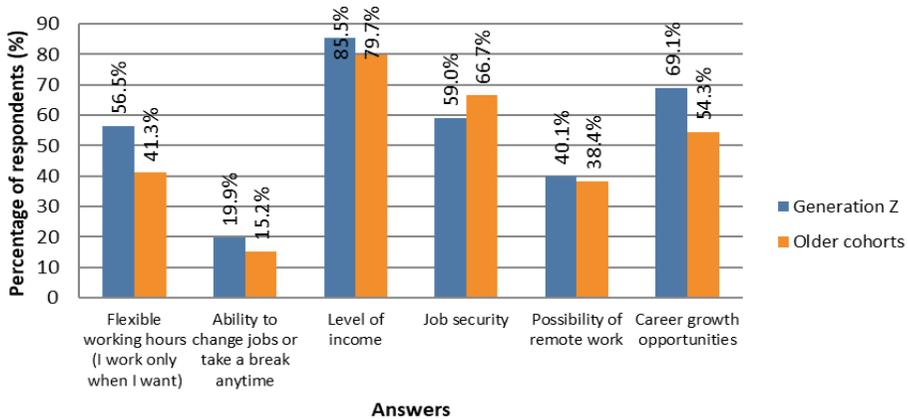
**Figure 3: Answers to Q3 - How would you describe your financial behaviour and attitude towards spending?**



Source: own elaboration

When evaluating job-choice factors, Generation Z prioritised flexibility, work–life balance, and remote-work options, whereas older cohorts emphasised job stability, regular income, and career growth. This contrast reflects the dual value structure identified in prior literature—security versus autonomy—indicating that younger generations increasingly integrate work around personal life rather than vice versa (Benítez-Márquez et al., 2022; Dokoupilová, 2024). The distinction between these value orientations is captured in **Figure 4**, which visualises the contrasting employment preferences of both generations.

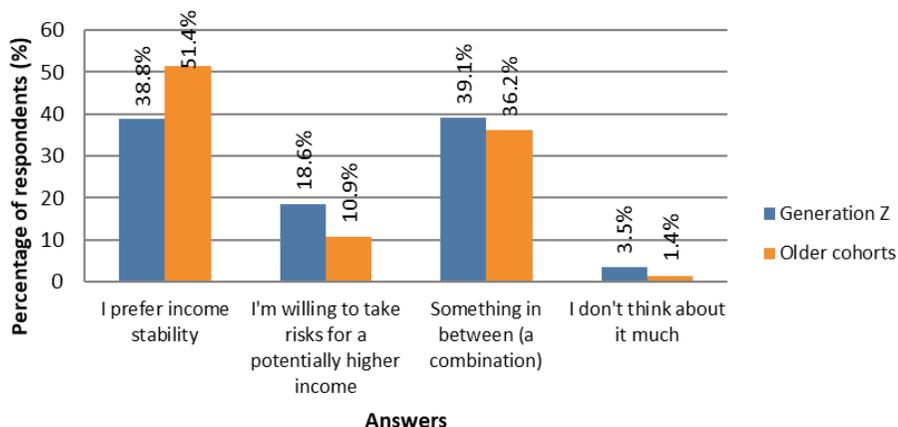
**Figure 4: Answers to Q4 - Which factors are most important for you when choosing a job?**



Source: own elaboration

Finally, attitudes toward financial risk show that Gen Z is more open to uncertain but higher potential earnings, while older cohorts prefer predictable income. However, the presence of intermediate responses in both groups suggests gradual convergence toward balanced risk perceptions. This tendency is depicted in **Figure 5**, illustrating how generational differences in risk tolerance are becoming less polarised.

**Figure 5: Answers to Q5 - Would you prefer a stable and secure income, or a higher but uncertain one?**



Source: own elaboration

## 4.2 Discussion

The results reinforce the theoretical expectation that Generation Z represents a shift toward intrinsic and relational work values while maintaining pragmatic concern for stability. Flexibility, well-being, and authenticity function as key dimensions of their psychological contract with employers (Rudolph & Zacher, 2020). Yet the persistence of financial caution among both groups confirms that economic security remains a universal priority, especially in post-pandemic labour markets (Deloitte, 2025; OECD, 2023).

These findings suggest that employers in Central Europe must align flexible work design with transparent structures and career predictability. Organisations that integrate autonomy, learning opportunities, and trust-based management are more likely to attract and retain Gen Z employees, while simultaneously addressing the expectations of older staff. Generational contrasts are thus not opposing extremes but complementary orientations—security provides the foundation on which flexibility and self-realisation can thrive.

## 5. CONCLUSION

The study examined generational differences in employment and financial values among Czech respondents, focusing on income preferences, flexibility, job priorities, and risk tolerance. The findings confirm that Generation Z favours autonomy, work–life balance, and purpose-driven employment, while older cohorts remain oriented toward job stability and financial security. Despite these contrasts, both groups demonstrate prudent financial attitudes and a shared need for predictability in uncertain labour markets.

These results support previous research suggesting that Generation Z redefines the meaning of decent work by integrating flexibility, self-development, and authenticity into traditional expectations of stability (Barhate & Dirani, 2022; Rudolph & Zacher, 2020; OECD, 2023). For employers, the implications are clear: sustainable workforce strategies require balancing flexible arrangements with clear structures and trust-based leadership. Recognising generational diversity not as division but as complementarity can help organisations create inclusive environments where both security and autonomy contribute to long-term engagement and well-being.

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## DIGITALLY READY? GENERATION Z AND EDUCATION IN THE VISEGRAD REGION

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*Adela Poliaková*<sup>2</sup>

**Abstract:** *This study examines the digital readiness, financial literacy, and investment behavior of Generation Z in Slovakia. Despite being highly digitally connected, this generation exhibits predominantly conservative and security-oriented investment patterns, with a strong preference for cash and deposit instruments. Using the Stax application during the European Researchers' Night, we collected primary data from 54 students from elementary to university students, capturing investment decisions, risk attitudes, and interactions with digital financial tools. The findings highlight a paradox: digital fluency does not automatically translate into financial competence. Factors such as limited financial education, economic uncertainty, and the use of digital platforms for simulation rather than real investments contribute to cautious behavior. Age and experience were found to moderate investment sophistication, suggesting the potential for more diversified portfolios as financial maturity develops. The study emphasizes the importance of integrating digital financial literacy into formal education and designing interventions that foster informed, responsible, and socially conscious investment decisions among young adults.*

**Key words:** *Generation Z, digital literacy, financial literacy, investment behavior, risk attitudes*

**JEL Classification:** *G02, G11, O33*

### 1. INTRODUCTION

Generation Z, typically defined as individuals born between the mid-1990s and early 2010s, represents a cohort uniquely shaped by rapid technological advancements, globalization, and heightened social awareness. Members of this generation are characterized by their entrepreneurial tendencies, strong engagement with social, environmental, and political issues, and remarkable digital fluency (Konieczna, 2025). These traits make Generation Z an increasingly significant demographic in various sectors, including the real estate market, financial services, and higher education. Understanding their preferences, expectations, and

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behaviors is therefore crucial for policymakers, educators, and industry stakeholders seeking to engage effectively with this generation.

Recent studies have highlighted Generation Z's distinct approach to financial and investment decisions. For instance, laboratory experiments and survey-based analyses indicate that their choices between savings and investment instruments are influenced not only by conventional demographic factors, such as gender and education, but also by psychophysiological responses, digital literacy, and exposure to financial content (Kashirina, 2024). Moreover, research in emerging markets such as Vietnam and India demonstrates that environmental, social, and governance (ESG) considerations, as well as behavioral and emotional factors, significantly shape their socially responsible investment intentions (Bich et al., 2023; Joshi et al., 2023; Thi et al., 2025). Generation Z investors display heightened sensitivity to perceived utility, ease of use, and trust in technology-mediated financial services, highlighting their digital-native identity and openness to novel investment platforms, including cryptocurrencies.

Parallel to their investment behaviors, Generation Z exerts substantial influence on education systems. As digital natives, these students expect innovative learning technologies and flexible pedagogical approaches that go beyond traditional classroom models (Hernandez-de-Menendez et al., 2020). Universities in the Visegrad region are experiencing increased competition for highly skilled students, who demand learning environments that facilitate not only knowledge acquisition but also the development of competencies relevant to jobs that may not yet exist. Investment in educational technologies has therefore become a central strategy to engage Generation Z, enhance learning outcomes, and prepare students for the knowledge-based economy.

This study aims to examine the digital readiness of Generation Z in Slovakia, with a focus on their educational preferences, use of learning technologies, and investment behavior. By integrating insights from behavioral finance, technology acceptance models, and innovation diffusion theory, the research seeks to understand how digital literacy can be translated into informed and sustainable investment behavior. The findings emphasize the need to strengthen digital financial literacy through formal education as a crucial step to enable young people to leverage their digital skills in making responsible financial decisions.

## **2. METHODOLOGY**

This study employed an interactive, technology-driven approach to examine the investment behavior, risk attitudes, and financial literacy of Generation Z students in Slovakia. Data collection was conducted during the European Researchers' Night, a public engagement event aimed at

promoting research awareness and participation across Europe. The choice of this setting allowed access to a large and diverse sample of digitally native students who are familiar with technology-mediated environments.

Participants used the Stax application (<https://buildyourstax.com/>), a digital platform designed to simulate real-world investment scenarios and provide insights into individual financial decision-making. Stax enables users to engage with a range of investment instruments, monitor their portfolio performance, and receive immediate feedback on outcomes, thereby combining experiential learning with behavioral data collection. Through this application, respondents could make investment decisions in a controlled, gamified environment, while also reflecting on their risk preferences, financial knowledge, and attitudes toward socially responsible investments. A total of 54 students participated in the study, from elementary to higher education. Data captured included:

Investment choices – allocation of virtual funds across different asset classes, including cash, deposits, stocks, and socially responsible investment options.

Digital engagement and financial literacy – assessed through user interactions with the application, the speed and frequency of decisions, and the use of educational prompts provided by the platform.

The methodology allowed for a mixed-methods approach: quantitative data were analyzed to identify patterns of investment behavior, age-related progression, and risk tolerance, while qualitative observations of participants' interactions with the app provided insights into behavioral tendencies and the translation of digital literacy into financial competence. This design provided a novel way to study Generation Z's investment behavior in a setting that aligns with their digitally mediated lifestyles, offering both ecological validity and opportunities for interactive learning.

### **3. RESULTS AND DISCUSSION**

The pilot research conducted during the European Researchers' Night 2025 provided insight into the investment preferences of Generation Z participants from Slovakia. Table 1 summarises the average age of respondents by individual investment type and by their primary investment profile, identified according to the maximum weight within their simulated portfolios.

**Table 1: Investment structure and age characteristics of Generation Z investors**

Investment	Average age	Primary investment	Average age by primary type
Comodities	17,66	-	-
Stocks	18,76	9,43%	15,8
Government bond	17,78	5,67%	20
Saving account	18,93	7,54%	15
Cash	19,06	35,85%	18,84
Certificate of deposit	19,57	24,53%	19,69
Gold	19,65	13,21%	21,14
Index fund	19,81	3,77%	25

Source: own elaboration

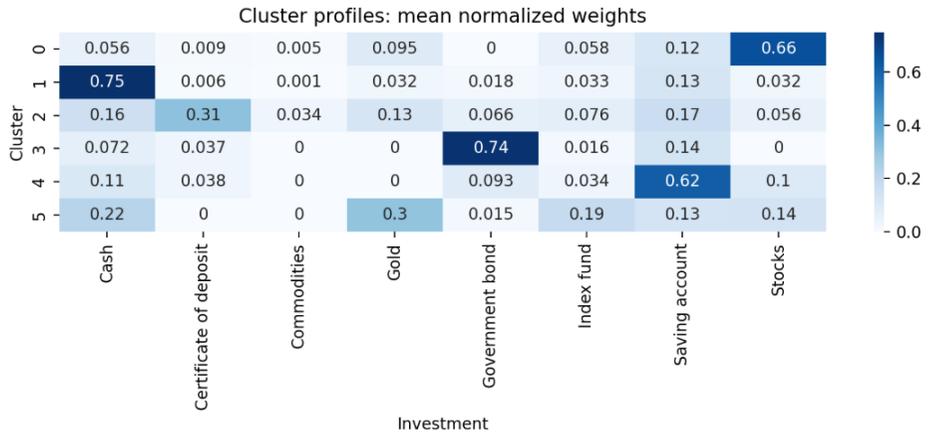
The data indicate that the majority of Generation Z respondents prefer conservative or low-risk investment options, such as cash (35.85%) and certificates of deposit (24.53%), with an average age of approximately 19 years. These results suggest a strong inclination toward security and liquidity rather than toward high-risk, high-return strategies. Investments traditionally considered “safe havens”, such as gold (13.21%), also show a relatively high representation, with an average investor age slightly above 19 years.

Conversely, more advanced and risk-based instruments, such as stocks (9.43%) and index funds (3.77%), were chosen by a smaller proportion of respondents. Interestingly, investors primarily allocating to index funds were on average the oldest group (25 years), indicating that investment sophistication and digital literacy may increase with age and financial experience within Generation Z.

The lowest average age was recorded among respondents investing in saving accounts (15 years), which may reflect the earliest stages of financial awareness and the influence of parental financial education or school-based programs. Similarly, the average age of stock investors (15.8 years) suggests that exposure to digital trading applications or gamified investment simulations could stimulate early interest but not yet translate into diversified portfolio behaviour.

Then we do a cluster analysis to profile investor types. To explore the heterogeneity of investment behaviors, respondents were grouped using K-means clustering based on their normalized portfolio allocations. The age variable was used solely for cluster profiling, not for model fitting. The model was evaluated using silhouette scores for K=2 to K=6, with the optimal separation observed at K=6.

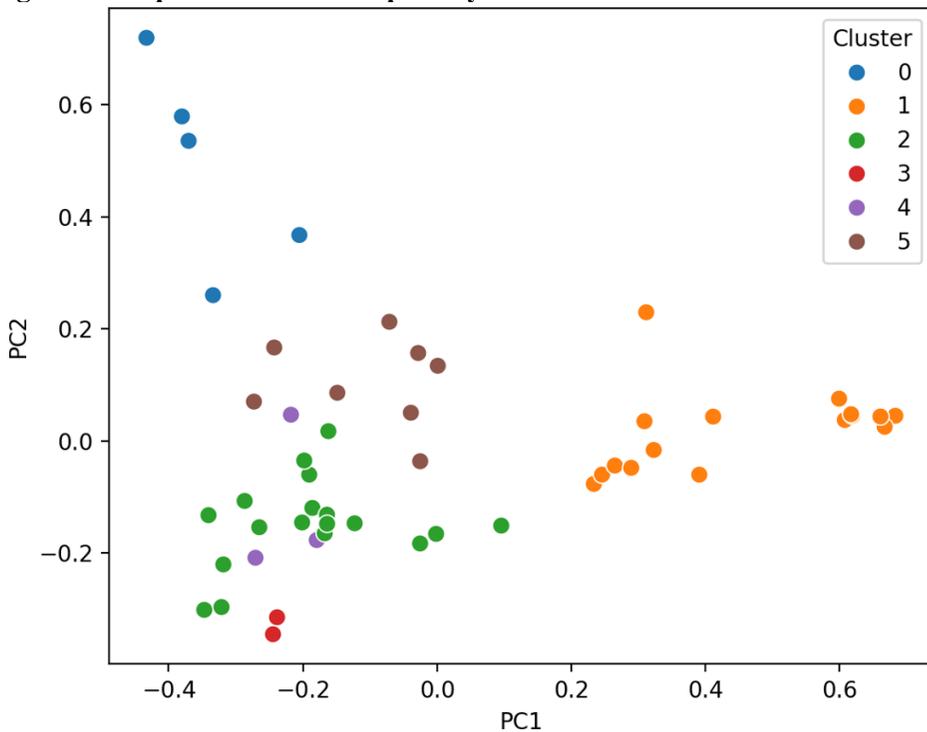
**Figure 1. Heatmap visualization show the relative portfolio composition per cluster (darker tones represent higher portfolio weights)**



Source: own elaboration

The average age within clusters ranged from 15.8 years (Cluster 0) to 20.75 years (Cluster 5), reflecting a gradual transition from liquidity preference to diversification as respondents mature.

**Figure 2. Respondents in PCA space by cluster**



Source: own elaboration

Interpretation of Behavioral Patterns:

- Cluster 0 – Growth with Equity Focus: Primarily stock-based portfolios with minor savings and gold exposure. These

respondents exhibit return-seeking behavior with high volatility tolerance, likely influenced by digital investment platforms and social media narratives around equities.

- Cluster 1 – Liquidity Holders (Cash-oriented): Dominated by cash positions, occasionally complemented by savings accounts. This group values security, accessibility, and minimal risk, typical for younger or less financially literate investors.
- Cluster 2 – CD-centered Balancers: Focused on certificates of deposit, supplemented by cash and savings accounts. These respondents aim to preserve capital while achieving modest yields, often representing the financially cautious middle segment.
- Cluster 3 – Bond Purists: Exclusively invested in government bonds, prioritizing predictable income and capital stability. This segment demonstrates traditional saving behavior, possibly influenced by family or formal education.
- Cluster 4 – Savings-only Investors: Allocate entirely to savings accounts, showing extreme conservatism and low financial engagement. Predominantly teenage respondents, likely early in their financial learning curve.
- Cluster 5 – Simplicity through Index Funds: Portfolios combining index funds, gold, and cash, representing the most mature and educated subgroup. These investors exhibit digital literacy and basic diversification awareness.

The findings of this study underscore the unique and paradoxical nature of Generation Z's financial behavior in the context of Slovakia. Although this generation is highly digitally connected and capable of managing nearly all aspects of daily life online from mobile photography to payments and money transfers their investment behavior remains predominantly conservative and security-oriented. This suggests that digital literacy, while necessary, is not sufficient to guarantee financial competence or the adoption of more sophisticated investment strategies.

Our results align with prior research indicating that Generation Z seeks fast, safe, and convenient financial solutions, often bypassing traditional banking methods in favor of mobile and digital platforms that allow for high levels of personalization and immediate access (Pašiušienė et al., 2024). However, despite this digital fluency, the prevalence of low-risk instruments such as cash and deposits reflects a preference for liquidity and perceived safety, consistent with the patterns observed in other European contexts (Le Fur & Outreville, 2022; Pinter et al., 2021).

Several factors help explain these conservative tendencies. First, regional education systems have historically placed limited emphasis on financial and investment literacy, leaving many young people without the

foundational knowledge needed to engage confidently in financial markets (Vlasic et al., 2022). Second, recent economic uncertainty may reinforce risk-averse behavior, prompting Generation Z to prioritize immediate liquidity over potentially higher, but uncertain, returns. Third, while digital investment tools are readily accessible, they are often used more for simulation, entertainment, or learning purposes rather than actual financial decision-making (Kozova et al., 2024).

Age and experience appear to be crucial moderators of financial behavior. Our study and previous research indicate that financial maturity develops gradually, with older respondents more likely to diversify their portfolios and include complex assets such as gold, index funds, or socially responsible investments (SRI) (Bich et al., 2023; Thi et al., 2025). This progression underscores the potential for Generation Z to become more active digital investors, provided that appropriate educational interventions and public policies are in place to support financial planning, risk assessment, and responsible use of technology.

Gender and cultural factors also influence investment perceptions and behaviors. Studies from the Visegrad region and other international contexts suggest that males and females may differ in risk tolerance, investment priorities, and engagement with digital finance tools (Chen et al., 2019; Kozova et al., 2024). Understanding these nuances is critical for designing inclusive educational programs and financial products tailored to the diverse needs of Generation Z.

Finally, our findings highlight the importance of integrating financial literacy with broader educational objectives, including environmental, social, and governance (ESG) considerations. Generation Z demonstrates interest in sustainable and socially responsible investments, yet hesitates to translate theoretical knowledge into practice without confidence, guidance, and institutional support (Pašiušienė et al., 2024; Vlasic et al., 2022). This gap between knowledge and action emphasizes the need for curricula and public policy initiatives that not only enhance financial literacy but also encourage active, informed, and socially responsible financial behavior.

In conclusion, while Generation Z in Slovakia is highly digitally literate, their financial behavior remains cautious, shaped by education, experience, and socio-economic context. Strengthening digital financial literacy, providing targeted guidance, and fostering experiential learning opportunities are essential to translate their digital readiness into sustainable investment behavior. These insights have important implications for educators, policymakers, and financial institutions aiming to engage effectively with this emerging generation of investors.

#### 4. CONCLUSION

The present study provides valuable insights into the digital readiness, financial literacy, and investment behavior of Generation Z in Slovakia. Despite being highly digitally connected and proficient in using technology for daily tasks, this generation exhibits predominantly conservative and security-oriented financial behavior. The prevalence of low-risk instruments such as cash and deposits highlights that digital literacy alone does not automatically translate into financial competence or the adoption of sophisticated investment strategies.

Several factors underpin this cautious approach. Limited emphasis on financial education in regional school curricula, the economic uncertainty of recent years, and the use of digital investment platforms primarily for simulation or entertainment purposes contribute to the conservative patterns observed. Moreover, age and experience play a crucial role, with older respondents showing greater financial maturity, diversified portfolios, and openness to complex or socially responsible investment products.

The findings underscore the importance of integrating digital financial literacy into formal education programs and public policy initiatives. By fostering knowledge of investment principles, risk assessment, and responsible use of digital tools, educational institutions and policymakers can help Generation Z translate their technological skills into informed and sustainable financial behavior. Additionally, attention to gender differences, cultural factors, and environmental, social, and governance (ESG) considerations can enhance the relevance and inclusivity of such interventions.

In conclusion, Generation Z in Slovakia represents a digitally capable yet financially cautious cohort. Strengthening financial literacy, promoting experiential learning through digital platforms like Stax, and providing targeted guidance on investment decision-making are crucial steps to empower this generation as informed, responsible, and future-oriented investors. The study contributes to both academic understanding and practical policy considerations, highlighting opportunities to bridge the gap between digital readiness and financial competence among young adults.

#### *Acknowledgements*

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# DIGITAL EXPECTATIONS, CAPACITY PRESSURES AND STUDENT WELL-BEING: HOW GENERATION Z PERCEIVES ACCESS TO HIGHER EDUCATION IN THE CZECH REPUBLIC

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**Abstract:** *This paper investigates how Generation Z students perceive the quality, accessibility, and capacity of higher education in the Czech Republic, with relevance for the wider Visegrád (V4) region. Drawing on a survey of 819 respondents, the study analyses 38 Likert-type statements (1–5) aggregated into five domains: digitalisation and technology, innovation in teaching, practical orientation and mobility, support and well-being, and capacity constraints and infrastructure. The findings indicate strong support for digitally enabled and pedagogically innovative learning environments. In contrast, perceptions of emotional support and teacher availability are consistently weaker, pointing to gaps in the student-facing support function. Correlation analysis further shows that perceived adequacy of the student–teacher ratio is positively associated with perceived teacher availability and students perceived emotional support, implying that staffing capacity is closely linked to day-to-day student experience. The paper concludes by outlining policy implications centred on strengthening human-resource capacity, improving support systems, and prioritising digital transformation that demonstrably enhances learning and student well-being.*

**Key words:** *capacity constraints, digitalisation, Generation Z, higher education, well-being*

**JEL Classification:** *I23, I28, J24, O15*

## 1. INTRODUCTION

Higher education systems across Central Europe increasingly operate under a dual pressure that is simultaneously pedagogical, organisational, and fiscal. On the one hand, students demand learning environments that are digitally supported, flexible, and personalised, and that credibly develop labour-market relevant competences, both discipline-specific skills and transversal capabilities (e.g., digital skills, communication, teamwork, and problem solving). On the other hand, universities face structural capacity constraints, reflected in staffing limitations, administrative workload, and constrained investment in infrastructure and student support services (European Commission, 2022). These pressures

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are reinforced by wider societal and economic transitions—including digital transformation, demographic change, and recurrent shocks that affect public funding and institutional resilience (European University Association, 2024). In the Visegrád (V4) region, this tension is especially salient because long-term resource constraints intersect with accelerating technological change and rising expectations regarding educational quality and student services (European Commission, 2020).

At the European level, digitalisation is not framed as an optional modernisation measure but as a strategic condition for competitiveness, inclusion, and resilience of education systems (OECD, 2024). The European Commission's Digital Education Action Plan (2021–2027) articulates a policy agenda aimed at strengthening digital capacity, improving digital competences, and supporting high-quality and inclusive digital education (European Commission, 2020). In parallel, the European Strategy for Universities highlights universities' role in responding to major societal challenges and emphasises the need to strengthen institutional capacity, including human resources and governance conditions that enable innovation in teaching, learning, and research (European Commission, 2022). Importantly, these policy orientations imply that digital transformation should be evaluated not only through technology adoption but also through organisational readiness, staff capacity, and the ability to sustain student-centred services at scale, dimensions where many universities experience bottlenecks (European Commission, 2022).

Generation Z is commonly defined in the international literature as the cohort born approximately between 1997 and 2012. In the context of higher education, the label is used here primarily as a shorthand for the current mainstream student cohort, which is largely composed of individuals born from the late 1990s onwards. Given that the survey targets students enrolled in Czech higher education programmes and that the typical age of university students falls within the early part of this cohort, the term "Generation Z" is analytically appropriate for describing the dominant respondent group. At the same time, cohort labels should not be treated deterministically; they are used in this paper as a contextual framing device rather than as a claim that generational membership alone explains individual attitudes or outcomes.

Generation Z, currently the dominant cohort in European universities, is frequently characterised by strong expectations regarding flexibility, interactivity, immediate feedback, and a learning climate that supports psychological safety and well-being (Cuppen et al., 2024). While cohort labels should not be treated deterministically, recent research indicates that teaching strategies better aligned with metacognitive support, active learning, and well-structured feedback loops can be particularly relevant for this group, especially in digitally rich environments (Chardonnens,

2025). These expectations also shape students' perceptions of institutional quality: digital tools and hybrid modalities are often valued when they increase accessibility and engagement, yet they can be perceived negatively when they are implemented without pedagogical coherence, adequate academic support, or reliable infrastructure. In short, from the student perspective, "digital" becomes meaningful primarily when it improves learning processes and relationships rather than merely increasing the quantity of online content (European University Association, 2024).

In addition, the rapid diffusion of generative artificial intelligence (GenAI) in education has further intensified the need to understand student expectations and institutional capacity. UNESCO's guidance on GenAI in education and research stresses the importance of human-centred implementation, capacity building, and governance safeguards, including academic integrity, data protection, and equitable access (UNESCO, 2023 (updated 2026)). For universities, GenAI creates an immediate practical challenge: students may expect AI-enabled learning support and faster feedback, while teachers and institutions must develop rules, competences, and assessment practices that preserve learning outcomes and academic standards (Cuppen et al., 2024). This amplifies the relevance of staff time, pedagogical training, and institutional support structures.

A second axis of pressure concerns student well-being. European comparative evidence shows that well-being and mental health have become prominent concerns in higher education, with measurable variation across systems and student groups. Even before the pandemic, campus well-being was increasingly discussed as a systemic issue; subsequent disruptions highlighted how strongly mental health outcomes depend on institutional support, availability of staff, and access to counselling and guidance services. In this context, students' perceptions of "access to education" extend beyond admission and formal participation; they include lived access to support, consultation, feedback, and a learning environment perceived as fair, responsive, and emotionally safe (Cuppen et al., 2024).

Against this background, the aim of this paper is to provide an empirically grounded profile of Generation Z perceptions of access to higher education in the Czech Republic, with implications for the wider V4 region. Although the dataset is national, the analysed dimensions: digitalisation, innovation in teaching, practical orientation and mobility, support and well-being, and capacity constraints, map directly onto challenges and policy priorities shared across Central European higher education systems. In methodological terms, the paper operationalises these dimensions through a structured survey instrument and reports domain-level patterns of perceived agreement. Substantively, the paper contributes by (i) quantifying the relative strength of key domains of

perceived quality from the student perspective; and (ii) examining whether perceived capacity conditions (notably staffing-related constraints) are associated with perceived access to teachers and perceived emotional support, thereby linking organisational capacity to student experience in a way that is directly relevant for governance and policy design.

## **2. PROBLEM FORMULATION AND METHODOLOGY**

The central research problem concerns a potential misalignment between the expectations of Generation Z and the structural conditions under which higher education institutions operate. While universities have intensified investments in digital learning tools and increasingly experiment with innovative pedagogical formats, students may still experience limited access to practice-oriented learning, constrained staff availability, and insufficient support for well-being. Importantly, these perceived shortcomings may not be independent; rather, they can be amplified by capacity pressure (e.g., student–teacher ratios, workload and time scarcity), which directly affects interaction, feedback, and the availability of supportive services.

### ***2.1 Data and instrument***

The empirical basis of the study is a structured questionnaire survey administered to students enrolled in Czech universities (N = 819). Data collection took place from 15 September 2025 to 30 November 2025. The instrument consisted of 38 attitudinal statements measured on a five-point Likert response format (1 = strongly disagree; 5 = strongly agree). Likert-type items are widely used to measure attitudes and perceptions; however, their measurement level and the appropriate analytical treatment remain debated. A common and defensible approach is to treat single Likert-type items primarily as ordinal, while recognising that composite scores formed by aggregating multiple items intended to measure a broader latent dimension can be analysed using means and standard deviations as approximately interval, particularly in larger samples and when the composite exhibits acceptable psychometric properties (Jamieson, 2004; Norman, 2010; Carifio & Perla, 2008).

### ***2.2 Domain structure and aggregation strategy***

For interpretation and reporting, the 38 statements were organised into five thematic domains: (i) Digitalisation and technology; (ii) Innovation in teaching; (iii) Practical orientation and mobility; (iv) Support and well-being; and (v) Capacity constraints and infrastructure. This domain structure follows the conceptual design of the instrument and enables a compact synthesis at a level that is meaningful for governance and policy discussion. From a measurement perspective, the approach is consistent with standard guidance on scale development and the construction of

multi-item measures, where conceptually related items are combined to represent a broader construct (DeVellis, 2017).

For each respondent, a domain score was computed as the arithmetic mean of all items belonging to the given domain. Table 1 reports the average domain scores across respondents and the standard deviation of respondent-level domain means. This descriptive strategy follows recommendations that distinguish between the analysis of individual Likert-type items (often best described via distributions) and the analysis of aggregated Likert scales (where means and dispersion can be informative and comparable across domains) (Boone & Boone, 2012).

### ***2.3 Aggregation and interpretability considerations***

Because the analysis relies on domain-level composite scores, aggregation is used primarily to support interpretative synthesis, i.e., to summarise perceived strengths and weaknesses across domains. Domain composites are therefore treated as descriptive indicators of perceived conditions rather than as psychometric scales intended for strict measurement inference. Interpretation remains anchored in substantive coherence of the item groupings and in transparent reporting of the underlying items.

### ***2.4 Correlation analysis and interpretation***

To examine whether perceived capacity conditions are related to perceived support, Pearson correlation coefficients were calculated for three items capturing (a) perceived adequacy of the student–teacher ratio, (b) perceived teacher availability outside of class, and (c) perceived emotional support. In line with common practice in applied social research, the analysis uses correlations to summarise the direction and magnitude of associations in Likert-based attitudinal data, without implying causality (Schober et al., 2018). Interpretation therefore focuses on effect size and substantive meaning rather than on statistical significance alone (Schober et al., 2018).

### ***2.5 Analytical strategy and policy orientation***

Overall, the analytical approach combines descriptive statistics at domain level with targeted correlation analysis and interpretative synthesis. This design supports the paper's applied objective: to translate student perceptions into actionable implications for higher-education governance and student-centred policy, particularly in settings where capacity constraints and digital transformation interact.

## **3. RESULTS AND DISCUSSION**

Table 1 and Figure 1 summarise the relative positioning of the five domains derived from the 38 Likert-type statements (N = 819). Overall,

students express the strongest agreement with items reflecting digitalisation and technology and practical orientation and mobility, while support and well-being and capacity-related conditions receive comparatively lower evaluations. This pattern is consistent with the broader European context in which institutions have accelerated digitally enhanced learning and teaching, yet report persistent constraints in staffing capacity, workload, and the sustainability of student support services (European University Association, 2024; Eurydice, 2024). The results therefore point to a core governance challenge: students visibly appreciate modernisation efforts that enhance the learning environment, but they also perceive bottlenecks in the “human layer” of higher education—time, attention, accessibility of staff, and psychosocial support.

### ***3.1 Digitalisation and innovation as strengths***

Digitalisation-related statements receive high agreement (mean domain score 3.93). Respondents broadly perceive modern technologies and digital tools as improving the quality of learning and express support for continued investment in digital infrastructure. This is aligned with European policy priorities that treat digital education capacity as a strategic condition for quality, inclusion, and resilience (European Commission, 2020; European Commission, 2022). It is also compatible with institutional-level evidence suggesting that digitally enhanced learning and teaching has become structurally embedded across Europe following the pandemic-era acceleration, even though implementation quality varies and depends strongly on staff readiness and governance arrangements (European University Association, 2021; European University Association, 2024).

Teaching innovation is evaluated positively as well (mean 3.72), indicating that students perceive tangible progress in innovative approaches and competence-oriented learning. From a learning-and-teaching perspective, this is important: innovation is valued by students primarily when it increases engagement and supports deeper learning, rather than merely changing the delivery format. Recent empirical research shows that faculty–student rapport and meaningful classroom engagement are strongly associated with deeper learning approaches, which helps to interpret why students can evaluate “innovation” favourably when it is experienced as pedagogically relevant and relationally supportive (Mattanah et al., 2024). In applied terms, the results suggest that Czech universities have achieved a relatively strong baseline in visible modernisation (digital tools, technology-enabled learning), and that students recognise this progress.

At the same time, the findings should not be read as a blanket endorsement of “more technology” irrespective of pedagogy. European analyses emphasise that digitally enhanced teaching requires continuous investment

not only in platforms and infrastructure but also in the teaching profession: training, time allocation, assessment redesign, and support for staff as innovators (Eurydice, 2024; European University Association, 2024). Consequently, the high agreement on digitalisation and innovation should be interpreted as support for *quality-enhancing* digital transformation, rather than as a signal that technological adoption alone resolves broader structural constraints.

### ***3.2 Practical orientation and mobility: high expectations, uneven experience***

The practical orientation and mobility domain reaches a high mean score (3.88), indicating that students strongly value the integration of theory and practice, cooperation with employers, and access to international mobility. This aligns with European policy priorities that emphasise skills development, employability, and the need to keep higher education responsive to rapidly evolving labour-market demands (OECD, 2024; European Commission, 2020). It is also consistent with the sustained policy salience of cross-border mobility as a mechanism for competence development, internationalisation, and personal growth within the European Higher Education Area (European Commission, 2020; European Commission, 2022).

At the same time, a domain-level average should be interpreted with caution, as it may conceal variation in students' access to opportunities. The results are compatible with the interpretation that experiences differ across institutions and fields of study, particularly with respect to the availability of internships and the perceived accessibility of mobility pathways. This reading corresponds with comparative European evidence suggesting that mobility participation can be shaped by structural barriers—such as information gaps, financial constraints, and administrative complexity—thereby producing unequal access even where relevant programmes exist (European Commission, 2022). Accordingly, the high mean can be understood primarily as a strong normative expectation: students view practice-based learning and mobility as core elements of high-quality higher education, while the underlying variation points to implementation and access challenges at the institutional level.

From a governance perspective, these findings support a targeted implication: strengthening practical learning and mobility is not merely a matter of programme design, but also of institutional capacity to build and coordinate partnerships, ensure adequate supervision of placements, and lower administrative burdens for students. In this sense, the practical orientation and mobility results anticipate the capacity-related patterns discussed in the subsequent section.

### ***3.3 Support and well-being: the weakest evaluated domain***

Support and well-being emerge as a comparatively weaker domain (mean 3.40). Students report lower perceived adequacy of mental-health support and emotional understanding from staff, and they indicate constraints on teachers' time for consultation. This finding resonates with European comparative reporting, which documents substantial concerns regarding student well-being and mental health and highlights systematic variation in the prevalence of reported difficulties (Cuppen et al., 2024). In many systems, well-being has become a structural policy issue rather than an individual-level matter, particularly because mental health is linked to persistence, learning outcomes, and inequality in student experience (Cuppen et al., 2024).

Importantly, the present results suggest that students perceive well-being support as insufficient not only in terms of specialised services (e.g., counselling) but also in day-to-day educational relationships—availability, responsiveness, and emotional support in academic interactions. This interpretation is consistent with evidence that academic support and well-being are closely intertwined; supportive academic environments and accessible guidance can contribute to students' perceived well-being and coping capacity (Wilson Fadji, 2024). Consequently, from a student-centred governance perspective, improving well-being is likely to require both (i) strengthening professional support services and (ii) expanding the time and capacity for formative interaction between students and teaching staff.

### ***3.4 Capacity pressures as a structural driver of perceived support***

The capacity constraints and infrastructure domain records the lowest mean score (3.30). Students perceive that staffing constraints and teacher overload reduce the individual attention available to students and make personalisation of learning more difficult. This is consistent with European system-level analyses that identify capacity to enhance learning and teaching—including support for staff and institutional capability—as a critical policy issue (Eurydice, 2024). It is also compatible with classic higher-education productivity arguments that when student–faculty ratios rise, institutions typically face pressure toward larger classes and increased teaching loads, which can reduce the space for individualised interaction and feedback (Massy, 2002).

The correlation evidence reinforces a structural interpretation. Perceived adequacy of the student–teacher ratio correlates positively with perceived teacher availability ( $r = 0.37$ ), and teacher availability correlates with perceived emotional support ( $r = 0.44$ ). The student–teacher ratio is also positively associated with emotional support ( $r = 0.34$ ). In applied terms, these associations suggest that capacity conditions are not merely administrative variables; they shape core elements of the student

experience—especially access to teachers, consultation time, and the perceived quality of relational support. This interpretive claim is consistent with empirical literature linking faculty–student interaction and rapport to student engagement and learning quality (Mattanah et al., 2024). It also aligns with evidence that students’ use of consultation opportunities (e.g., office hours) can be associated with academic performance, which makes staff availability a plausible mechanism through which capacity affects outcomes (Hsu et al., 2022).

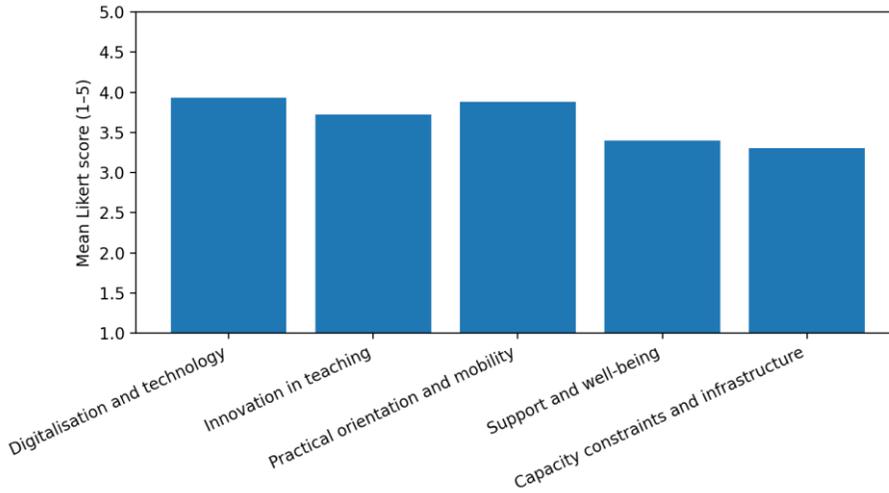
Methodologically, the correlations are interpreted as associations rather than causal effects. In line with established guidance, the discussion emphasises magnitude and plausible mechanisms while avoiding causal over-claims (Schober et al., 2018). Nevertheless, the pattern is substantively meaningful: within students’ perceptions, the capacity environment appears linked to the availability of academic interaction, which in turn links to perceived emotional support. From a governance standpoint, the results therefore argue for capacity-sensitive reforms, particularly those that combine digital transformation with staffing, workload, and support-system strengthening, rather than reforms that rely predominantly on technological solutions (European University Association, 2024; Eurydice, 2024).

**Table 1: Mean values of thematic domains**

<b>Thematic dimension</b>	<b>Mean score</b>	<b>Standard deviation</b>
Digitalisation and technology	3.93	0.51
Innovation in teaching	3.72	0.50
Practical orientation and mobility	3.88	0.43
Support and well-being	3.40	0.65
Capacity constraints and infrastructure	3.30	0.45

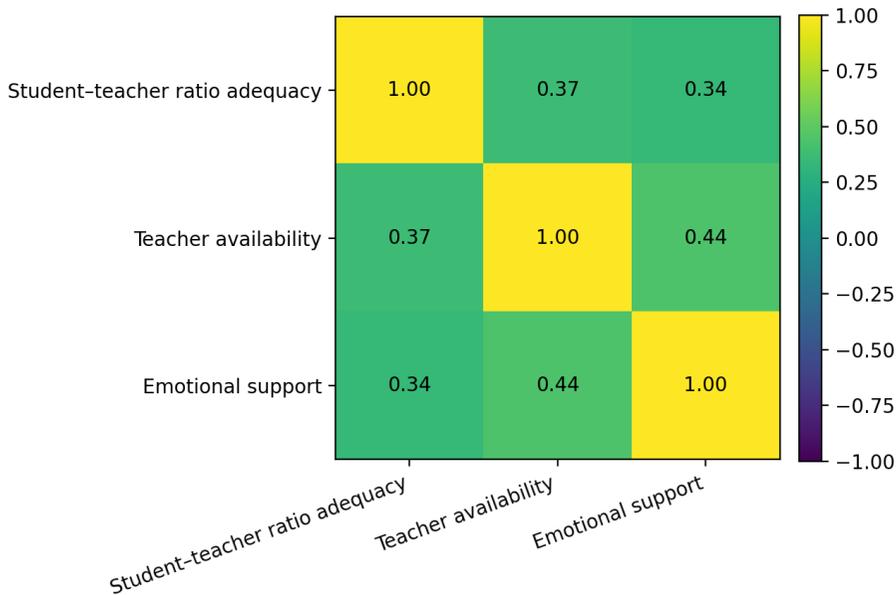
Source: Author’s calculations based on survey of 819 respondents.

**Figure 1: Bar chart of thematic domain means**



Source: Author's calculations.

**Figure 2: Correlation between capacity conditions and perceived support**



Source: Author's calculations.

#### 4. CONCLUSION

The survey evidence indicates that Generation Z students in the Czech Republic evaluate digitalisation and innovative learning environments positively and express strong orientation toward practice-based learning and mobility. At the same time, the comparatively weaker evaluation of support and well-being, together with the lowest ratings in the capacity

constraints domain, signals a governance tension: institutions may be able to modernise tools and delivery formats faster than they can strengthen the human and organisational conditions required for sustained, individualised academic support. This interpretation is consistent with European-level observations that digitally enhanced learning has expanded rapidly, while staffing capacity, workload pressures, and the sustainability of student support services remain persistent constraints (European University Association, 2024; Eurydice, 2024).

A key contribution of the study is the demonstrated link between perceived capacity conditions and perceived support. The observed correlations suggest that perceived adequacy of staffing conditions is meaningfully associated with students perceived access to teachers and perceived emotional support. While these associations do not establish causality, they strengthen a structurally plausible account in which capacity pressure influences the relational and supportive dimensions of higher education, features that are central to student experience and well-being (Schober et al., 2018; Cuppen et al., 2024). In policy terms, this implies that digital transformation strategies should be pursued in parallel with capacity-responsive measures; otherwise, technology risks being perceived as a substitute for rather than an enabler of high-quality interaction and support (European Commission, 2022; European University Association, 2024).

#### ***4.1 Policy and managerial implications***

For higher-education policy makers and institutional leaders in the V4 region, the results point to a coherent package of capacity-responsive measures. First, institutions should prioritise investment in academic staff and student-facing support roles, such as counselling, study advising, tutoring, and learning design, alongside digital infrastructure, because capacity is not merely a budgetary constraint but a determinant of teacher availability and the perceived quality of support (European University Association, 2024; Eurydice, 2024). Second, workload and administrative burden should be reduced through streamlined processes, more transparent workload allocation, and practical support for teaching innovation (e.g., instructional design assistance), to protect time for consultation, feedback, and high-impact teaching practices that students experience as meaningful (European University Association, 2024). Third, mental-health and well-being provision should be expanded in a way that is visible, accessible, and integrated with academic guidance, as European comparative evidence indicates that student well-being has become a systemic higher-education issue requiring coordinated institutional responses rather than ad hoc services (Cuppen et al., 2024). Fourth, universities should institutionalise cooperation frameworks with employers to scale internships, applied projects, and practice-based modules, supported by clear quality standards, adequate supervision capacity, and equitable

access mechanisms across fields of study (OECD, 2024). Finally, mobility opportunities should be scaled while reducing barriers—financial, informational, and administrative—so that mobility policies explicitly address access inequalities through targeted support and simplified procedures (European Commission/EACEA/Eurydice, 2023).

#### **4.2 Limitations**

Several limitations should be acknowledged. First, the study relies on self-reported perceptions, which may be influenced by respondents' current experiences, expectations, and response styles. Second, the research design is cross-sectional; therefore, associations should not be interpreted as causal relationships, and temporal ordering cannot be verified (Schober et al., 2018). Third, although the sample size is substantial (N = 819), the findings' generalisability beyond the Czech context may be bounded by national institutional characteristics and the composition of the respondent pool (e.g., field of study, institution type). Finally, the aggregation of Likert-type items into domain scores is a defensible and common strategy, but it benefits from complementary psychometric evidence (e.g., reliability and dimensionality checks) when space allows (Boone & Boone, 2012; Tavakol & Dennick, 2011; DeVellis, 2017).

#### **4.3 Future research agenda**

Future research can strengthen explanatory power and policy usefulness in three directions. First, it would be valuable to test mediation models that reflect the structural interpretation suggested by the present correlations, for example: capacity conditions → teacher availability → perceived emotional support / well-being, using structural equation modelling or path analysis on validated multi-item constructs (DeVellis, 2017). Second, comparative designs across the V4 region (or across institution types) could identify whether the same capacity, support mechanisms hold under different funding regimes, governance structures, and student compositions (European University Association, 2024; Eurydice, 2024). Third, longitudinal or repeated cross-sectional data would allow researchers to examine whether digital transformation initiatives and staffing policies measurably shift student perceptions over time, and whether improvements are distributed equitably across student groups (Cuppen et al., 2024).

In sum, the findings indicate that Czech Generation Z students appreciate digitalisation and teaching innovation yet experience notable constraints in support and capacity-related conditions. The policy implication is straightforward: sustainable quality improvements require a balanced strategy that pairs digital modernisation with investment in human capacity, workload-sensitive governance, robust student support, and inclusive access to practice-based learning and mobility.

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Any remaining errors are the responsibility of the author.

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## APPENDIX A. Instrument structure, focal correlation items, and respondent profile

**Table A1. Domain structure of the questionnaire (38 Likert-type statements; 1 = strongly disagree, 5 = strongly agree).**

Domain (index)	Thematic focus (brief)	No. of items (k)
Digitalisation and technology	Digital tools, infrastructure, perceived contribution of technology to learning quality	8
Innovation in teaching	Innovative pedagogies, competence-oriented learning, engagement-enhancing formats	9
Practical orientation and mobility	Work-related learning, employer cooperation, internships, international mobility	7
Support and well-being	Academic guidance, psychosocial support, perceived adequacy of well-being services	3
Capacity constraints and infrastructure	Staffing capacity, workload/time scarcity, perceived limitations in student-facing provision	11

**Note:** Domain scores were computed as the arithmetic mean of items within each domain. All 38 items were complete in the analytical sample; therefore no missing-data thresholding or imputation was applied.

Item mapping (questionnaire order, items 1–38): Digitalisation and technology (items 2, 5–7, 12, 15, 24–25); Innovation in teaching (items 1, 3, 8–10, 13–14, 16–17); Practical orientation and mobility (items 4, 11, 21–23, 26, 35); Support and well-being (items 18–19, 38); Capacity constraints and infrastructure (items 20, 27–34, 36–37).

**Table A2. Focal items used in the association analysis (Pearson *r*).**

Code	Construct	Short label	Item wording (exact questionnaire wording; Czech)
STR	Capacity adequacy	Student–teacher ratio	„Počet studentů připadajících na vyučujícího v mých kurzech je přiměřený pro získání dostatečné individuální pozornosti.“
AVAIL	Academic access	Teacher availability	„Cítím, že moji vyučující mají dost času na zodpovězení otázek studentů a poskytnutí podpory a pomoci.“
EMO	Relational support	Emotional support	„Cítím se emocionálně podporován a chápaný personálem a fakultou mé univerzity.“

**Note:** Correlations were interpreted as associations, not causal effects. Pearson *r* is reported as the primary summary measure. Coefficients are based on the analytical sample (N = 819) with two-tailed p-values ( $\alpha = 0.05$ ).

**Table A3. Respondent profile (analytical sample N = 819).**

Characteristic	Categories	n	%
<b>Gender</b>	Female	545	66.5
	Male	261	31.9
	Prefer not to say	12	1.5
	Other/unclear entry	1	0.1
<b>Level of study</b>	Bachelor's	748	91.3
	Master's	51	6.2
	Other/unclear entry	20	2.4
<b>Field of study (collapsed categories)</b>	Economics & business	433	52.9
	Humanities & social sciences	193	23.6

<b>Characteristic</b>	<b>Categories</b>	<b>n</b>	<b>%</b>
	Security / criminology	77	9.4
	Natural sciences	50	6.1
	Engineering & technology	21	2.6
	Other fields	45	5.5
<b>Institution type</b>	Private university	422	51.5
	Public university	397	48.5
<b>Age (years; grouped)</b>	≤ 20	447	54.6
	21–24	221	27.0
	25–29	42	5.1
	≥ 30	108	13.2
	Missing/invalid	1	0.1

*Notes:* Percentages may not sum to 100 due to rounding. “Other fields” aggregates small categories (education, health/medical, agriculture/forestry, hospitality/tourism, and miscellaneous entries). One age entry was missing/invalid.

## COORDINATED SYSTEM OF MUTUAL RECOGNITION OF EDUCATIONAL DOCUMENTS

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**Abstract:** *The freedom of movement of persons, the freedom to provide services, and the freedom to carry out economic activities are among the fundamental freedoms of the internal market of the European Union. The above-mentioned freedoms enable the mobility of business and the performance of work activities in the territory of EU member states. The access to the internal market is undoubtedly promoted by a coordinated system of mutual recognition of educational documents issued by national authorities in the EU Member States. The paper examines in a broader context the conditions for the recognition of educational documents in the context of EU law and Slovak legislation regarding the system of automatic recognition of qualifications based on harmonised minimum requirements. The aim of the paper is also to identify problems in this area and focus on crucial moments of the recognition, including the examples in the Visegrad (V4) countries which are the EU Member States.*

**Key words:** *diploma, directive, education, law*

**JEL Classification:** *I0, J0, J6*

### 1. INTRODUCTION

Freedom of movement of persons is considered a fundamental freedom of citizens of the EU Member States and is one of the four freedoms of the EU internal market, enshrined in Article 45 of the Treaty on the Functioning of the European Union (TFEU). This freedom gives every citizen of the European Union, regardless of the place of residence, the right to freely move to another Member State in order to work and/or to settle down there in order to pursue an occupational activity on the territory of a Member State, without being discriminated against because being a national of another Member State.

### 2. PROBLEM FORMULATION AND METHODOLOGY

An important tool for the successful implementation of the freedom of movement of persons is the Coordinated System of Mutual Recognition of

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Educational Qualifications. Coordination and harmonised rules in the Member States are necessary so that self-employed persons and professionals can carry out their activities in another Member State or temporarily offer their services there. For this reason, it is necessary that diplomas, certificates and other evidence of professional competence issued in other Member States are mutually recognised. In the research paper, we analyse the current state of recognition of educational qualifications and point out the importance of measures introduced at the European Union level that facilitate access to employment in the territory of other EU Member States.

The research methodology is based on a combination of analysis of primary European Union legislation and secondary acts, as well as Slovak legislation referring to the recognition of educational documents. In this context, we analysed data published in Special Report 10/2024: Recognition of professional qualifications in the EU - A basic but little and inconsistently used mechanism (produced by the EU Court of Auditors) [12].

The research questions were formulated as follows:

1. In which way the obstacles to the free movement of persons are being removed in the EU Member States regarding the coordinated system of mutual recognition of educational documents?
2. In which way is it possible to obtain a European professional card?
3. How is the mutual recognition policy implemented in the Visegrad (V4) countries?

### **3. PROBLEM SOLUTION / RESULTS / DISCUSSION**

#### ***3.1 General legal basis***

Education is a human right, and higher education, which is a tool for acquiring and deepening knowledge, creates an exceptionally rich cultural and scientific contribution for both individuals and society [14]. Conscious of the fact that the right to education is a human right, and that higher education, which is instrumental in the pursuit and advancement of knowledge, constitutes an exceptionally rich cultural and scientific assets for both individuals and society. Education and training are the best way to increase employability and help people get decent jobs. We see education as a key condition for the future, but the access to the European labour market is precisely the system of mutual recognition of education and educational qualifications. Education and culture policies are the responsibility of the EU Member States and their regional and local authorities. The European Union plays an important complementary role,

when it comes to removing obstacles to the recognition of education acquired in another Member State.

The quality of education is determined by the following factors:

- a) high-quality experts with relevant education in the field in which they work and with practical experience
- b) high-quality educational activities
- c) innovations and new technologies used within the educational process.

Freedom of movement of persons is regulated in the primary law which is the Treaty on the Functioning of the European Union, in Articles 26, 45, 46, 53. Moreover, the right to move and reside freely is a fundamental right enshrined in Article 45(1) of the Charter of Fundamental Rights of the European Union (the Charter of Fundamental Rights).

Based on the decision of the Court of Justice of the European Union in the legal case (C-184/99, Grzelczyk, ECLI:EU:C:2001:458, paragraph 31.) the status of citizen of the European Union is to be “the fundamental status of nationals of the Member States [3].

The general education policy of documents is regulated in Articles 165 and 166 of the Treaty on the Functioning of the European Union. The provision of Article 53(1) of the Treaty on the Functioning of the European Union empowers the European Union that it shall, acting in accordance with the ordinary legislative procedure, issue directives for the mutual recognition of diplomas, certificates and other evidence of formal qualifications and for the coordination of the provisions laid down by law, regulation or administrative action in Member States concerning the taking up and pursuit of activities as self-employed persons.

The primary legislation is complemented by a wide range of secondary acts concerning the freedom of movement of persons and the mutual recognition of qualifications. Examples include:

- a) Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications (Text with EEA relevance). (OJ L 255, 30.9.2005, pp. 22–142) [5].
- b) Directive 2013/55/EU of the European Parliament and of the Council of 20 November 2013 amending Directive 2005/36/EC on the recognition of professional qualifications and Regulation (EU) No 1024/2012 on administrative cooperation through the Internal Market Information System (‘the IMI Regulation’) Text with EEA relevance (OJ L 354, 28.12.2013, pp. 132–170) [6].

- c) Council Recommendation of 26 November 2018 on promoting automatic mutual recognition of higher education and upper secondary education and training qualifications and the outcomes of learning periods abroad (OJ C 444, 10.12.2018, pp. 1–8) [4].

Given the legal nature of directives, which Member States must transpose into national law, the secondary acts in question were transposed in the Slovak Republic into Act No. 422/2015 Coll. on the recognition of educational documents and on the recognition of professional qualifications and on amending and supplementing certain acts, as amended. The generally binding regulation establishes, among other things, procedures for recognizing educational documents and professional qualifications [1].

The following rights are included in the freedom of movement for worker's catalogue:

- a) access to employment,
- b) conditions of employment and work, as regards remuneration, dismissal, health and safety at work, and, if Union workers become unemployed, reinstatement or re-employment
- c) access to social and tax advantages
- d) membership of trade unions and eligibility for workers' representative bodies
- e) access to training
- f) access to housing (Art. 2 Directive 2014/54/EU) [7].

To facilitate the free exercise of a profession or the right to work in other EU countries, the following recognition systems have been introduced (Table 1).

**Table 1: Systems of Recognition**

<b>Automatic recognition</b>	<b>Automatic recognition of certain occupations</b>	<b>General system</b>
for professions whose <b>minimum training conditions are harmonised</b> to a certain extent at EU level: doctors, nurses responsible for general care, dentists, veterinary surgeons, midwives, pharmacists and architects	for <b>certain occupations</b> based on their professional experience: professionals in crafts, trades and industry	for the abovementioned professions which are not covered by the automatic recognition system is based on the <b>principle of mutual recognition of qualifications</b>

Source: due to [5].

The established EU system for the recognition of professional qualifications and harmonised minimum training requirements for several professions enhance transparency and build mutual trust in higher education systems. The established systems for the mutual recognition of education contribute to the formation of the European Higher Education Area, by removing obstacles to the recognition of qualifications at both school and higher education levels. In this context, we share the view that education and culture are the key to the future.

In addition to the European Union, other international organizations also have recognition of qualifications in their portfolio. The General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted in Paris (12 to 27 November 2019) Global Convention on the Recognition of Qualifications concerning Higher Education. Entry into force 5 March 2023, in accordance with its Article XVIII [14]. The National Council (Parliament) of the Slovak Republic approved the Convention by Resolution No. 1363 of March 23, 2022, and decided that it is an international treaty that, according to Article 7(5) of the Constitution of the Slovak Republic, takes precedence over laws of the Slovak Republic. The President of the Slovak Republic ratified the Convention on 3 June 2022. The instrument of ratification was deposited with the depositary, who is the Director-General of UNESCO, on 29 June 2022. The Convention entered into force on 5 March 2023 and on that date entered into force for the Slovak Republic.

The Convention established the following principles for the recognition of qualifications in the field of higher education [14]:

- a) The recognition of qualifications shall be carried out in a transparent, fair, timely and non-discriminatory manner, in accordance with the rules and regulations of each Party.
- b) Recognition decisions shall be based on adequate, reliable, accessible and up-to-date information on higher education systems, institutions, programmes and quality assurance mechanisms.
- c) Applicants for recognition of qualifications shall provide in good faith adequate and accurate information and evidence of the qualifications obtained and shall have the right to appeal against the decision.
- d) Competent authorities responsible for the recognition of qualifications shall assess qualifications in good faith, shall clearly justify their decisions and shall have mechanisms for appealing against the recognition decision.

The Council of Europe and UNESCO initiated the adoption of the Convention on the Recognition of Qualifications concerning Higher Education in the European Region (Lisbon Recognition Convention) in 1997 [14].

The Ministry of Foreign Affairs of the Slovak Republic announced that the Convention on the Recognition of Qualifications concerning Higher Education in the European Region was adopted in Lisbon on 11 April 1997. On behalf of the Government of the Slovak Republic, the Minister of Foreign Affairs of the Slovak Republic signed the instrument of approval of the Convention on 21 June 1999. The Convention entered into force for the Slovak Republic on 1 September 1999.

The convention provides a legal framework for the recognition of higher education qualifications and upper secondary education and training qualifications that give access to higher education. In this context, it must be considered that a characteristic feature of the mutual recognition of professional qualifications is that education obtained in the territory of one Member State is considered equivalent to education obtained in the territory of another Member State.

### 3.2 Education documents

Given the objectives of this research paper, we clarify the substantive meaning of the term educational document, since it is the basic document for the recognition of qualifications. In our paper, we present a legal definition that is decisive for the recognition of educational documents and is fully consistent with the relevant EU legislation.

Due to the § 4 Law No. 422/2015 Coll. on the recognition of educational documents and on the recognition of professional qualifications in the Slovak Republic [1], the proof of education is „a *university diploma, graduation diploma, school-leaving examination certificate or final examination certificate issued by a recognised educational institution in accordance with the legislation of a Member State or a third country.* “

A university diploma is a document confirming the completion of an accredited study program in a relevant field of study and the award of an academic title. It is issued by a university. The table 2 lists the types of education.

**Table 2: Levels of education**

First-level higher education BC Programme	Second-cycle study Mgr. Programme	Third-level higher education PhD Programme
first-level higher education by completing a first-level study program, the standard length of which is at least three years,	a second-cycle study programme in a Member State whose standard duration of study, together with the previous completion of a first-cycle study programme, is at least four years	third-level higher education by completing a third-level study program, the standard length of which is at least three years

Source: Own processing according to [1].

A high school diploma is a document of education issued by a recognized secondary school, which confirms that its holder has obtained complete secondary general education by completing an educational program in the field of education, the duration of which is at least four years, or complete secondary vocational education by completing an educational program in the field of education, the duration of which is at least four years, or part of the educational program of the department of education at the conservatoire, the duration of which is at least four years. A final examination certificate is a document of education issued by a recognized secondary school, which confirms that its holder has obtained lower secondary vocational education by completing an educational program in the field of education, the duration of which is at least two years, or secondary vocational education by completing an educational program in the field of education, the duration of which is at least three years.

### ***3.3 Institutional Framework***

The Centre for the Recognition of Educational Documents (CRED), as an organizational part of the Ministry of Education, Research, Development and Youth of the Slovak Republic, is a national authority with nationwide jurisdiction for the recognition of educational documents and professional qualifications from abroad.

The given procedures for the recognition of educational documents are determined by the fulfilment of the conditions. The Ministry of Health of the Slovak Republic is authorized to confirm the equivalence of education in regulated health professions obtained in the territory of the Slovak Republic. All health professionals of every profession from every member state are subject to regulations in the field of acquired education, which means that their education must meet certain requirements that are imposed on the content and scope of the acquired education, professional training, and the professional practice performed [9].

The given procedures for the recognition of educational documents are determined by the fulfilment of the conditions. The Ministry of Health of the Slovak Republic is authorized to confirm the equivalence of education in regulated health professions obtained in the territory of the Slovak Republic. All health professionals of every profession from every member state are subject to regulations in the field of acquired education, which means that their education must meet certain requirements that are imposed on the content and scope of the acquired education, professional training, and the professional practice performed.

Automatic recognition of educational documents applies to the following health professions: doctor, dentist, nurse, pharmacist and midwife. The

equivalence of education in regulated health professions is demonstrated by a school-leaving certificate, a diploma of higher professional education, a diploma of university education.

The Ministry of Education, Research, Development and Youth of the Slovak Republic maintains the National regulated professions database.

Individual professions are classified into categories of regulated professions and include craft and regulated trades, economics and finance, transportation, justice, social work, sports, education, healthcare and other. For example, the category of economics and finance includes professions as tax consultant, financial adviser, independent financial agent and others.

### ***3.4 European Professional Card***

To properly implement the policy of mutual recognition of educational qualifications, the European Union has introduced a harmonised system of introducing the European Professional card for doctors, nurses, pharmacists, physiotherapists, mountain guides, real estate agents and engineers [2]. The functioning of the system of automatic recognition of qualifications depends on trust in the conditions of training leading to the qualification of professionals [6] (Recital 24 Directive 2013/55/EU) [6].

Each EU Member State determines the conditions for issuing the European Professional Card. In Slovak Republic, this is the competence of the Ministry of Education, Research, Development and Youth of the Slovak Republic. The European Professional Card can be characterized as a document that its holder has a common set of minimum knowledge, skills and competences necessary to exercise a certain profession in the territory of the host EU country.

The card does not have a physical form. The European Professional Card (EPC) is an electronic certificate proving that a professional has fulfilled all the necessary conditions for the purposes of temporary and occasional provision of services in a host Member State or recognition of professional qualifications for the purposes of establishment in a host Member State [10].

The European Professional Card is valid in the territory of the EU Member States, thus removing obstacles to the smooth exercise of professional activities for regulated professions by citizens of the Member States. The procedure is simpler, faster and more transparent than traditional procedures for the recognition of qualifications. The advantage over traditional procedures for the recognition of qualifications is mainly simplicity and speed. The Card improves synergy between the competent authorities and eliminates duplication of administrative burden and

procedures of the competent authorities in the recognition of qualifications.

In addition to the European Commission, the European Labour Authority (ELA) is also a significant authority in the field of recognition of educational qualifications.

### ***3.5 Screening the recognition of professional qualifications in the EU***

The European Union regularly monitors the correct implementation of secondary acts in practice in Member States. The EU Member States are obliged to submit reports to the European Commission on the implementation of the obligations laid down in secondary acts. One such report is Special report 10/2024: The recognition of professional qualifications in the EU [12].

Based on a secondary analysis of the data presented in the above report, we found that Member States have been introducing mechanisms for the recognition of professional qualifications. Table 3 provides an overview of Regulated professions in the EU, by number of total decisions declared by the competent authorities in the 27 member states, for 2017-2021.

**Table 3: Regulated professions in the EU, by number of total decisions declared by the EU Member States competent authorities, for 2017-2021**

<b>Regulated professions</b>	<b>Number of decisions</b>
Nurse	26 624
Secondary school teacher	25 707
Doctor of medicine	25 162
Ski instructor	13 375
Physiotherapist	12 963
Dental practitioner	11 291
Childcare worker	6 471

Source own processing referred to [12].

The data show that the most recognized qualifications are in the field of nursing. Secondary school teacher and Doctor of medicine also have a relatively large representation in the field of recognition of qualifications. It follows from the above that the introduced system has proven itself in practice.

In Table 4, we compared the Number of regulated professions per member state in specific group of EU Member States, named Visegrad (V 4) countries in 2023, which included Hungary, Czechia, Poland and Slovakia, which officially recognized educational documents of individuals in 2023.

**Figure 4: Number of regulated professions per Visegrad (V4) countries in 2023**

<b>Visegrad countries</b>	<b>Number of regulated professions</b>
Hungary	415
Czechia	365
Poland	297
Slovakia	284

Source: own processing referred to [12].

According to official findings, the most share of educational documents were recognized in Hungary in 2023 and the least share in Slovakia. In Table 5 we analyse Recognition decisions taken by competent authorities in the Visegrad countries for the period 2017-2021.

**Table 5: Recognition decisions taken by the Visegrad member states authorities in 2017-2021**

<b>V4 Member State</b>	<b>Recognition decisions</b>
Hungary	1 823 Positive, 6 Negative
Czechia	4 517 Positive, 7 Negative
Poland	2 029 Positive, 17 Negative
Slovakia	2 383 Positive, 6 Negative

Source: own processing referred to [12].

From the above, the authorized national authorities in all Visegrad countries in the period 2021-2027 recognised almost all submitted documents, with some minimal share of negative decisions.

#### **4. CONCLUSION**

Considering the formulated research questions, it may be concluded: In the EU Member States, obstacles to the mutual recognition of documents and qualifications are gradually being removed. The basic EU instrument is the directives, which individual states transpose into national legislation. The given system helps the freedom of movement of persons and the protection of fundamental human rights. Currently, there is an Automatic System of Recognition of Professional Qualifications and a General System of Recognition of Professional Qualifications, which applies to regulated professions.

Secondary analysis of data from Special report 10/2024: The recognition of professional qualifications in the EU [12] we found out that citizens are making use of the labour mobility mechanism based on the recognition of professional qualifications. A positive change was caused by the introduction of the mandatory use of the Internal Market Information System for the notification of automatically recognised qualifications, which improved the exchange of information between competent

authorities from EU Member States. However, overall, it must be stated, the new measures have brought only marginal added value in practice.

In this context, we are of the opinion that EU citizens should be provided with reliable and consistent information, in particular, procedures should be unified in all EU Member States in mutual recognition systems, and IT technologies should be applied more convincingly in the process of recognition.

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## DIFFERENCES IN THE VALUE ORIENTATION OF GENERATION Z IN THE V4 COUNTRIES

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**Abstract:** *This article analyzes the value orientation and expectations of Generation Z members within the Visegrad Four (V4) countries, with a specific focus on the sectors of education and the labor market. The literature review defines Generation Z as the first truly digital cohort, whose attitudes are shaped by a constant online presence, a lack of experience with non-democratic regimes, and an increasing emphasis on sustainability and work-life balance. The empirical section presents the findings of a quantitative questionnaire survey conducted in 2025 among 819 university students in the V4 region. The results indicate that the absolute priority for this generation is practical training (90.5% of respondents) and the integration of modern technologies, such as artificial intelligence and virtual reality, into the educational process. Concurrently, the study identifies a critical deficit in mental health support at universities, which only 41.2% of students perceive as sufficient. The article's conclusions offer recommendations for academic institutions and employers aimed at modernizing teaching methods, enhancing flexibility, and adapting management practices to meet the specific value-based needs of young adults in Central Europe.*

**Key words:** *generation Z, V4 countries, value orientation, higher education*

**JEL Classification:** *I21 – Analysis of Education, I23 – Higher Education; Research Institutions, J24 – Human Capital; Skills; Occupational Choice; Labor Productivity*

### INTRODUCTION

At the outset, it is necessary to emphasize that the issue of Generation Z has been the subject of many studies from different parts of Europe, to which this article refers, for example, Perić, N. et al. (2020) or Tirocchi, S. (2024). Researching these topics in the V4 countries is therefore highly desirable, as it can contribute to a better understanding of the specifics of the Central European region. The contribution is based on the general foundations of professional studies and research conducted in the given

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area of Central Europe, and supplements them with its own empirical findings in the Czech Republic. It also shows the differences between individual countries, as documented, for example, by the study by Andruszkiewicz, K. et al. (2023). Professional articles are mainly focused on the Central European environment. For example, Jas-Liszok, K. (2025) compares Slovakia, the Czech Republic and Poland. However, the results of the studies are often not generalizable and relate to a specific area or to students of a specific field from Generation Z, e.g. students of pedagogy or, in our case, students of economics. The research is important primarily from a practical point of view – it provides companies with better insight into the job expectations of young people, which allows them to plan recruitment and retention more effectively (e.g. Egerová et al., 2021). This article also presents the main results of research conducted on this topic in the Czech Republic in 2025.

## **LITERATURE REVIEW**

Generation Z, which includes people born between 1995 and 2010, is the first generational cohort in the region to be influenced by digital technologies from an early age and to grow up in a fully democratic political system. It is the first truly digital generation, whose members have been in contact with the internet practically since birth, making them natural users of mobile devices and applications (Perić, N. et al., 2020). These "digital natives" do not have their own experience with a period of limited political freedom, which fundamentally shapes their understanding of freedom, movement and social obligations. As Perić et al. emphasize, this generation also faces challenges associated with global terrorism, school violence, economic uncertainty or the impacts of mortgage crises. Within the Visegrad region, Generation Z is located at the border of traditional national values and global social currents. This generation is characterized by a constant online presence and active use of social networks to maintain and deepen relationships with family and friends. Despite their high technological literacy, they are increasingly cautious about protecting their privacy, with approximately 60% of their members expressing concerns about the way companies handle their personal information (Perić, N. et al., 2020). The way young people obtain information and communicate is significantly shifting towards speed and visual formats. Generation Z is the first generation that is not largely dependent on parents or educators for information. Although technology is an integral part of their lives, this does not automatically mean a desire to constantly acquire the latest technological products. They still spend a significant amount of time watching television, more than two hours a day, with YouTube being their preferred platform. They perceive online

shopping as comfortable and self-evident, they are permanently connected to the internet, social networks and digital platforms and when making decisions, they systematically search, compare, analyze and evaluate available information and options (Perić, N. et al., 2020). Members of Generation Z emphasize open and transparent communication, flexible work arrangements, team cooperation and clearly defined career growth based on individual performance. In contrast, traditional rigid hierarchical structures and cultures with a high level of risk appeal to them only minimally. They therefore associate professional fulfillment with a sense of stability and meaningful involvement in a work team. In the area of work motivation, they prioritize job security, opportunities for professional growth and internal recognition over purely financial incentives. A pleasant work environment, a degree of autonomy and a supportive leadership style often have more weight for them than the amount of salary or the benefits system, which reflects a shift towards value- and relationship-oriented approaches to employment (Berea, 2025). A study conducted by Tirocchi, S. (2024) at the University of Turin further demonstrates that young people prefer values related to the inclusion of people with health disadvantages, nature conservation, sustainability, personal growth and overall quality of life. They also place great importance on authenticity and credibility in media content. This attitude is reflected in their media preferences, where they prefer films and documentaries based on "true events", while often rejecting fictional formats such as reality shows. In an environment characterized by the spread of false information, Generation Z pays increased attention to fact-checking, but does not seek authority from traditional institutions, but rather from influencers and peers operating on digital platforms such as YouTube or Instagram (Tirocchi, 2024). Kutlák (2021) points out generational differences between Generation Y and Z, and his research confirms a higher level of autonomy and independence among members of Generation Z. At the same time, this generation shows significant potential for environmentally responsible behavior, which is also evidenced by the findings of the studies by Jankowski & Świsłocki (2025). In the work environment, Generation Z employees emphasize job satisfaction, opportunities for personal and professional growth, fair evaluation, recognition and job security. They prefer a work environment that supports collaboration, creativity and innovative approaches, and at the same time expect open communication and active support in adapting to the company culture. Given their need for continuous and rapid feedback, organizations are forced to adapt management practices to the specific expectations of young employees. Differences in value preferences between men and women also play a significant role. Generation Z emphasizes authenticity, diversity and continuous development, with a key value for them being work-life balance in the context of dynamic social and technological changes (Žuromskaitė-Nagaj, 2024). At the same time,

potential leaders from generations Y and Z prioritize self-development, stability and openness to change (Črešnar & Nedelko, 2020). Research by Andruszkiewicz et al. (2023) focuses on environmentally responsible consumer behavior of generation Z and points to its key role in achieving the Sustainable Development Goals at the European Union level and in a global context. The findings also reveal significant differences between respondents from Poland and Germany, as well as between genders, especially in terms of awareness, perception of the state of the environment and willingness to accept higher prices for environmentally harmful products. Engagement in environmentally friendly activities is linked to how people perceive the state of nature.

Generation Z is generally more engaged in environmentally friendly behavior than older generations, but primarily in areas that do not require significant financial outlay or lifestyle changes. These are most commonly household activities such as waste separation, energy conservation, or using reusable bags, while activities outside the home or more costly investments are less common (Parzonko et al., 2021). Other studies indicate that Generation Z's strong orientation to digital platforms, coupled with environmental awareness and a preference for affordable ways of obtaining goods, are key factors supporting the growth of the sharing economy (Surmacz et al., 2024). Ludviga & Sluka (2023) identified several specific characteristics of Generation Z in the work context. Although their core work values are largely comparable to those of other generations, they are characterized by a stronger emphasis on passion for work, a global perspective, and a technologically advanced workplace. Generation Z places greater importance on educational benefits, healthy lifestyle benefits, childcare, insurance and social guarantees. Non-financial motivators such as job security and the expectation that the employer will be socially responsible and dynamically developing are essential for them. Kubátová (2016) draws attention to the growing tendency of workers to pursue self-employment through online platforms, while they often develop social contacts and professional relationships in the environment of coworking centers. When entering the labor market, Generation Z prioritizes personal interpersonal contact, while using digital technology primarily as a tool for obtaining information and supporting teamwork. Professional role models in their immediate environment are essential for young workers; at the same time, they expect a combination of a high degree of autonomy and supportive, mentor-oriented leadership from their superiors, which reflects their orientation towards long-term professional development. The motivation of Generation Z is significantly influenced by the content of the work performed and the quality of interpersonal relationships in the workplace, which in many cases leads to a preference for independent entrepreneurship over traditional employment. Approximately one fifth of Generation Z members are considering an entrepreneurial career and more

than a quarter of them prefer working in coworking spaces, although Czech respondents were more likely to prefer a classic office layout in this regard. In the future, however, it can be assumed that a significant part of Generation Z will choose flexible forms of independent work that can meet their requirements for autonomy, professional development and social integration (Kubátová, 2016). Generation Z's motivation for volunteering is primarily associated with personal satisfaction, self-development and expanding competences, and these motivators are closely related to their value system. At the same time, research confirms that the attitude towards volunteering correlates with personal values and that the low participation of young people is not a consequence of social indifference. Pro bono programs can therefore be effectively supported through educational campaigns tailored to the lifestyle and mindset of Generation Z, with the next phase of research including expert interviews and focus groups to contribute to a deeper understanding of their attitudes towards volunteering (Garai-Fodor et al., 2021). Jas-Liszok (2025) notes that students perceive values as landmarks in family and professional life, with their relationship to values shaped by personal experiences, the society and culture in which they live. Value preferences differ by nationality and religious beliefs – for example, Polish respondents place greater emphasis on God and material stability, while Slovaks value interpersonal relationships and friendship more.

Significant differences can be observed in attitudes towards religious values between Czechs, Slovaks and Poles: Poles mention them most often, Slovaks less often and Czechs least often, which demonstrates how strong the influence of culture and tradition on the importance of religion in the value hierarchy of individuals is. The study by Starecek et al. (2019) shows that for Generation Z, education is one of the most important values, which directly affects their academic performance – students with a higher orientation towards education achieve better results in professional subjects such as mathematics or operational analysis, which positively contributes to their future employment. Moral and social values develop in them in a closely interconnected way and influence each other, while their level is partly shaped by the previous type of education. Understanding the value orientations of Generation Z is therefore key for effective pedagogical leadership and human resource management, because young "digital people" are motivated especially if they see personal meaning in their activities, and they show specific needs in the area of soft skills; teachers and employers who understand these values can better stimulate the performance of students and employees and more effectively develop their potential in a dynamic environment (Starecek et al., 2019). Research from Austria has shown that employers need to take into account that the possibility of combining work from home with office presence is essential for Austrian Generation Z, as personal social contacts in the workplace are very important to them and represent one of the main

lessons learned from the pandemic. Furthermore, research confirms that this generation strongly values flexibility in all forms of work environments (Aldjic & Farrell, 2022). Research conducted in the Czech Republic on Generation Z, conducted by Hovořáková and Pauknerová, confirms that the successful entry of Generation Z into the Czech labor market is influenced by their life and work values, career adaptability and resilience, which are significantly correlated with their expectations and value orientation. Generation Z emphasizes the possibility of online communication at work and the value of "prestige", which reflects their need to share successes and experiences digitally, while regional differences in the Czech Republic do not fundamentally affect their value system. Understanding these values, expectations and abilities can help companies effectively attract and retain young employees, with the main goal being to support long-term employability, flexibility and career development of Generation Z, not just short-term job retention (Hovořáková & Pauknerová, 2024).

## **RESEARCH IN THE CZECH REPUBLIC**

The research was conducted between October and November 2025 and focused on the perception of Generation Z's approach to education in the V4 region. It was a quantitative questionnaire survey that was distributed among university students, mainly bachelor's degree programs. A total of 819 respondents aged 19–25 participated in the study. Respondents rated individual aspects of education on a Likert scale of 1–5 (1 = strongly disagree, 5 = strongly agree).

Practical training turned out to be the absolute priority of Generation Z students in the V4 region. A total of 90.5% of respondents agreed that the combination of theory and practice is essential for their education, and 77.5% support close cooperation between universities and businesses. However, only 41.2% of students agreed that universities offer sufficient internship opportunities, which clearly indicates a significant gap between students' expectations and the current offer. Recommendations include the introduction of mandatory internships in all study programmes, the systematic building of long-term partnerships with businesses and the integration of practical projects directly into the curricula. Technology is seen as an essential part of modern education. 86.1% of students support the digitalisation of teaching, 79.1% agree with the use of artificial intelligence and virtual reality, 81.2% support flexible learning systems and 60.4% prefer hybrid teaching combining online and face-to-face learning. These results show that technology is not an "add-on", but a key tool for quality education. Recommended measures include continued investment in digital infrastructure, training teachers in the effective use of modern technologies and the development of hybrid and flexible forms of

teaching. Traditional teaching received an average rating. 60.3% of students agree that traditional methods meet their expectations, but only 26.4% state that lectures support their attention, and 52.0% note that teachers use innovative methods only partially. Thus, students do not reject traditional teaching completely, but they identify its shortcomings: low attention, passivity and limited engagement. Recommendations include investing in training teachers in activating methods, supporting interactive forms of teaching, shortening lecture duration and combining different teaching formats. Support for mental health was rated the worst. Only 41.2% of students agree that they have sufficient support from the university, 45.0% feel emotionally supported by the faculty and 25.2% stated that the demands of study negatively affect their mental health. This deficit may have long-term consequences for students and the quality of education. Recommended measures include expanding psychological counselling capacities and introducing preventive mental health programmes. The overall assessment showed that practical teaching and career are rated positively (74% of students), technology and innovation very positively (90%), international cooperation good (79%), infrastructure satisfactory (65%), quality of teaching and methods average (46%), mental health support insufficient (41%). The main priorities for university policy are strengthening practical teaching, investing in digital technologies, fundamentally strengthening mental health support, modernizing teaching methods and improving the student-teacher ratio. Generation Z therefore prefers practical, technologically supported and flexible education, they do not reject traditional methods, but demand their evolution, with the critical point being mental health support, which is insufficient in the current system and requires systematic strengthening.

## **DISCUSSION**

The research confirms that Generation Z places great emphasis on practical learning, technological support and flexibility of educational forms. Respondents prefer a combination of theory and practice, close cooperation between universities and businesses and the use of digital tools, artificial intelligence or virtual reality. At the same time, they show a critical attitude towards traditional teaching methods, which they assess as insufficiently activating and less interactive, while their interest in classic lectures is not decreasing, but they expect them to be modernized. Another crucial aspect is the support for mental health, which is insufficient in the current education system in the V4 region. A low level of emotional and psychological support can negatively affect not only academic results, but also future professional adaptability and satisfaction of Generation Z in the labor market. This aspect is in line with international findings that show that flexibility, autonomy, open communication and a friendly work environment are among the main

values of young people. Yet, Generation Z's preferences in the area of education and professional values are surprisingly homogeneous – the priority is practical, technologically supported education and an environment that supports personal development, collaboration and stability.

The research also shows a high orientation of Generation Z towards environmental and social issues. Young people prefer sustainable behavior, active verification of information and ethical consumer decision-making. This aspect also influences their expectations towards organizations and institutions, which should reflect the principles of social responsibility and support personal fulfillment and self-development.

## **CONCLUSION**

The study confirms that Generation Z in the V4 countries has a specific value orientation, which combines digital competences, practical education, pro-environmental awareness and an emphasis on flexibility, open communication and personal development. Regional differences exist, especially in cultural and religious values, but key professional and educational preferences are very similar across the region.

The practical implications of this research are significant for universities and employers. Institutions should invest in modernizing teaching methods, introducing flexible and hybrid forms of education, strengthening mental health support and ensuring opportunities for practical cooperation with businesses. Companies and organizations should adapt the work environment to the expectations of Generation Z - emphasizing autonomy, collaboration, self-development and ethical responsibility.

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## BIBLIOMETRIC ANALYSIS OF THE SCOPE OF GENERATION Z RESEARCH IN THE V4 COUNTRIES

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**Abstract:** *Generation Z is currently entering the labor market during a period of climatic and political change, which has stimulated increasing scientific interest in further examining and characterizing this generation within the V4 countries. The growing number of scientific studies in the Central European context therefore requires a systematic evaluation of existing knowledge about this generation. The main objective of this study is to present the results of a bibliometric analysis focused both the quantitative development and thematic structure of Generation Z research in the Visegrad Group countries (V4). The methodology is based on secondary research of available literature (desk research) and a comparative analysis of current scientific studies published in the Scopus and Web of Science databases. The conducted bibliometric analysis confirmed Poland's dominant position confirmed Poland's dominant position in both absolute and relative publication shares within the V4 countries, while Slovakia and the Czech Republic demonstrate high qualitative stability across both databases. Furthermore, it was found that publications in the V4 region primarily concentrate on the intersection of digital marketing, environmental responsibility, and Generation Z's adaptation to technological challenges in the labor market.*

**Key words:** *Generation Z, Pro-environmental behavior, Sustainability, Visegrad Group*

**JEL Classification:** *J11, M12, M31, O52, Y10*

### 1. INTRODUCTION

The entry of Generation Z into the labor market and into the position of a dominant consumer force represents a significant social and economic challenge for the Visegrad Group countries (Slovakia, Czechia, Poland

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and Hungary). This cohort, shaped by digital technologies and global interconnectedness, brings new value orientations and behavioral patterns into the Central European space. Scientific interest in this issue within the V4 region has increased significantly in recent years, leading to the need to systematize existing knowledge. The present paper responds to this publication trend and, through bibliometric tools, maps the intensity and direction of academic research in V4 region. The analysis focuses on identifying key publication trends and scientific profiles of individual countries. Such processing makes it possible not only to understand the current state of knowledge but also to reveal existing research gaps. The analyses provide new insights into Generation Z in the context of published scientific studies. The results of the presented study therefore offer a comprehensive view of the scientific discourse on Generation Z within the specific socio-economic environment of the Visegrad Group countries.

## **2. LITERATURE REVIEW**

The following section of the manuscript is divided into four separate subsections that address the most important research areas in the context of Generation Z. We defined Generation Z, value orientations, their relationship to sustainability, as well as the perception of technologies and opportunities in the current labor market within the V4 countries.

### ***2.1 Definition of Generation Z***

Generation Z is often referred to as "Digital Natives," "Post-millennials," or "Zoomers," representing the first cohort that grew up in an environment of full digitalization and unlimited access to information (Zarczyńska-Dobiesz a Chomałowska, 2014). Unlike their predecessors (Generation Y), Generation Z does not know a world without the internet and perceives the virtual space as a complementary part of reality (Kiedik et al., 2023). Although minor deviations in temporal definition appear in the literature, there is a prevailing consensus that these are individuals born approximately between 1995 and 2010 (Jurenka et al., 2018; Starczewski et al., 2023; Andruszkiewicz et al., 2023). In a broader context, Halicka et al. (2025) state the birth period as 1992–2010, emphasizing that this cohort shares specific cultural and economic experiences that fundamentally shape their value hierarchy (Kaminska and Mularczyk, 2025). They are characterized as "Homo Globalis" – a generation connected by global fashion, food, and technologies, yet facing challenges associated with the continuous formation of identity in the digital space (Lesková and Lenghart, 2023).

### ***2.2 Value orientation and environmental attitudes in the V4 region***

A key element of Generation Z's identity in the Visegrad region is their relationship to sustainability. The concept of sustainable development,

built on environmental, economic, and social pillars, is perceived as a pathway to securing the needs of future generations (Starczewski et al., 2023; Bartková and Hudáková, 2025). Research suggests a high level of environmental awareness. For example, in Poland, young people demonstrate strong support for urban forestry and the protection of trees as elements of urban infrastructure (Jankowski and Świsłocki, 2025). However, when comparing pro-environmental behavior between Poland and Germany, a “value-action gap” emerges—although young consumers declare pro-ecological values, their actual purchasing decisions are often limited by price and economic advantage (Fafilek et al., 2024; Knezevic et al., 2025). In the area of nutrition, taste and health are primary factors, while the environmental impacts of food systems are perceived rather as a secondary benefit (Andruszkiewicz et al., 2023).

### ***2.3 Digital Technologies and Sensory Marketing***

Generation Z’s consumer behavior is defined by their technological proficiency. Mobile applications have become standard tools for travel planning and information search, where principles of experiential tourism dominate (Niemczyk et al., 2023). The post-pandemic period in Slovakia confirmed a definitive shift of young people away from traditional media toward digital content and social networks, influencing their psychological stability (Lesková and Lenghart, 2023). The highly competitive environment of brick-and-mortar stores forces retailers to utilize elements of sensory marketing. The strategic use of music (audio marketing), scents, and visual stimuli in fashion stores aims to create an emotional experience that the online environment cannot replicate (Cagala and Babcanova, 2024). Music in stores demonstrably affects mood and can stimulate impulsive purchases among young consumers. On the other hand, negative aspects of the digital era are also emerging in the V4 region, such as the increase in compulsive (pathological) shopping as a form of mood compensation after the pandemic (Jankowski and Świsłocki, 2025). The development of digital technologies thus influences purchasing behavior and the marketing channels used.

### ***2.4 Generation Z in the Labor Market***

Generation Z’s entry into the workforce brings a transformation of the work environment. This generation prefers flexibility, remote work, and demands meaningfulness in the activities they perform (Kiedik et al., 2023). Unlike previous generations (Generation X and Generation Y), financial motivation is not their sole criterion (Jurenka et al., 2018); respect and work-life balance are essential (Żarczyńska-Dobiesz a Chomątowska, 2014). Regional specifics of the V4 show that although young people are the most technologically proficient, they often show lower loyalty to employers and high mobility (Rigó et al., 2024; Wójcik and Lukasinski, 2024). Representatives of Generation Z confirm that, in

addition to professional expertise, they consider soft skills and ethical values to be crucial (Kiedik et al., 2023). Overall, it can be stated that representatives of Generation Z possess a different composition of competencies and skills than previous generations; therefore, cooperation across different generations is expected (Silberg et al., 2025). This reality must be addressed within human resource management departments in organizations.

### **3. MATERIALS AND METHODS**

The following section is divided into two parts dedicated to presenting the evaluated data, describing the data processing procedure, and introducing the software used for analysis.

The main objective of the presented study is to provide the results of a bibliometric analysis focused on the scope and structure of Generation Z research in the Visegrad Group countries (V4 – Slovakia, Czech Republic, Poland, and Hungary). To achieve this objective, the following research questions were established:

**RQ1:** *What is the quantitative distribution and relative share of scientific publications focused on Generation Z in the V4 countries within the Scopus and Web of Science databases?*

**RQ2:** *Which thematic areas dominate the current scientific research on Generation Z in the V4 countries?*

#### **3.1 Data Collection**

Data collection and processing were carried out from December 2025 to January 2026. Two of the world's most significant scientific databases were selected as primary data sources: the Web of Science (WoS) Core Collection and the Scopus scientific database. These databases were chosen for their recognized quality standards, multidisciplinary nature, and broad coverage of publications in the Central European region. The search strategy was based on a combination of keywords in the "Topic" field (WoS) and "Article Title, Abstract, Keywords" (Scopus). The search string used was: ("Generation Z" OR "Gen Z") AND ("Slovakia" OR "Czech Republic" OR "Poland" OR "Hungary"). The retrieved records were subsequently subjected to a deduplication process to ensure data integrity and prevent multiple counting of identical works indexed in both databases. The entire dataset was finally manually reviewed to confirm the relevance of the filtered contributions with respect to the geographic and thematic boundaries of the research.

#### **3.2 Data Processing and Analysis**

The obtained data were exported in .csv and .txt formats for further processing. The analysis proceeded in two phases: Quantitative analysis

(MS Excel): Microsoft Excel was used to process descriptive statistics, create comparative tables, and calculate percentage shares. This tool enabled a clear categorization of scientific performance by country and a comparison of coverage between the WoS and Scopus databases. Visual network analysis (VOSviewer): For deeper identification of thematic areas, the VOSviewer software was used. This tool is specifically designed for bibliometric mapping and visualization of relationships between scientific data. Within this study, VOSviewer was used to conduct the analysis of keyword co-occurrence. The workflow in this program includes: map construction, where the software analyzes keyword frequency and the strength of their interconnections; clustering, where the algorithm automatically groups related terms into color-coded clusters representing dominant research themes; and visualization, resulting in a network map where node size represents term frequency and the distance between nodes indicates the degree of scientific relatedness.

#### 4. RESULTS

Within this study, the defined research questions were evaluated to provide answers to an important area of inquiry regarding scientific publications in the V4 countries.

**RQ1:** *What is the quantitative distribution and relative share of scientific publications focused on Generation Z in the V4 countries within the Scopus and Web of Science databases?*

Within the first research question, we analyzed the frequency and percentage share of publications indexed in the two most significant global databases. Detailed statistical data for the Scopus database are presented in Table 1, and data for the Web of Science (WoS) are shown in Table 2. A comparison of both tables reveals the clear dominance of Poland, which achieves the highest absolute number of publications in both sources.

**Table 1: Distribution of scientific publications in the Scopus database about Generation Z in the V4 countries**

Countries	Absolute frequency - Scopus	Relative frequency [%]	Cumulative frequency [%]
Slovakia	60	12.80	12.80
Czechia	75	16.10	28.90
Poland	273	58.30	87.80
Hungary	60	12.80	100.00
<b>Total V4</b>	468	100.00	-

Source: Own elaboration, 2026

As shown in the Table 1 and Table 2, the highest number of publications in the Scopus database comes from Poland, which is 58.3% of the overall contribution of V4 countries, while in the WoS it is 41.5%. Slovakia shows almost identical values in both databases (60 in Scopus compared to 57 in WoS)

**Table 2: Distribution of scientific publications in the WoS database about Gen Z in the V4 countries**

Country	Absolute frequency - WoS	Relative frequency [%]	Cumulative frequency [%]
<b>Slovakia</b>	57	21.10	21.10
<b>Czechia</b>	64	23.70	44.80
<b>Poland</b>	112	41.50	86.30
<b>Hungary</b>	37	13.70	100.00
<b>Total V4</b>	270	100.00	-

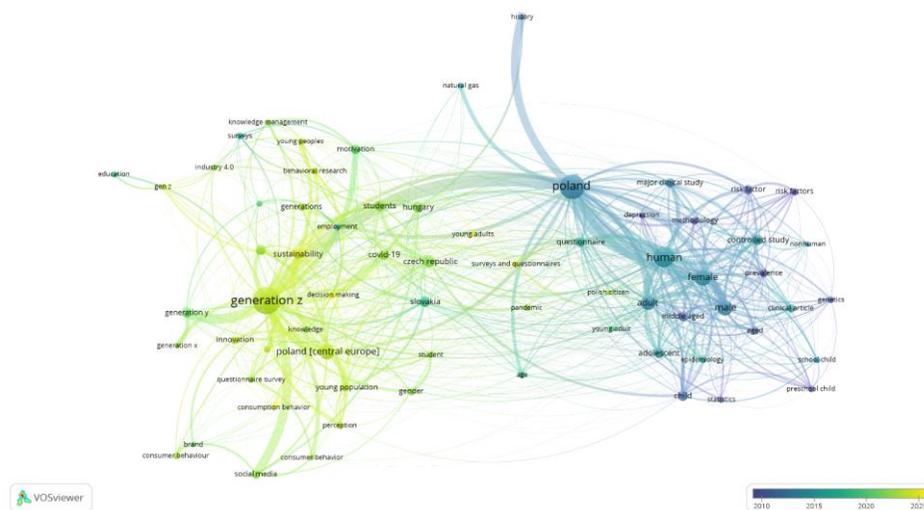
Source: Own elaboration, 2026

From a relative perspective, the cumulative share in Table 2 shows that Slovakia and the Czech Republic together account for nearly 45% of total V4 research in the WoS database, which is approximately half as much as their share in the Scopus database (about 29%). The results suggest that although Poland is the quantitative leader in the region, Slovak and Czech research on Generation Z is more deliberately oriented toward manuscripts included in the Web of Science Core Collection. By comparing the results, we can state that Hungary has the lowest share of publications among the V4 countries.

***RQ2: Which thematic areas dominate the current scientific examination of Generation Z in the V4 countries (Slovakia, Czech Republic, Poland, Hungary)?***

The second research question focused on identifying the key thematic areas that shape the current scientific discourse on Generation Z in the V4 countries. For this purpose, a keyword co-occurrence analysis was conducted, the results of which are visualized in Figure 1 (SCOPUS database) and Figure 2 (WoS database).

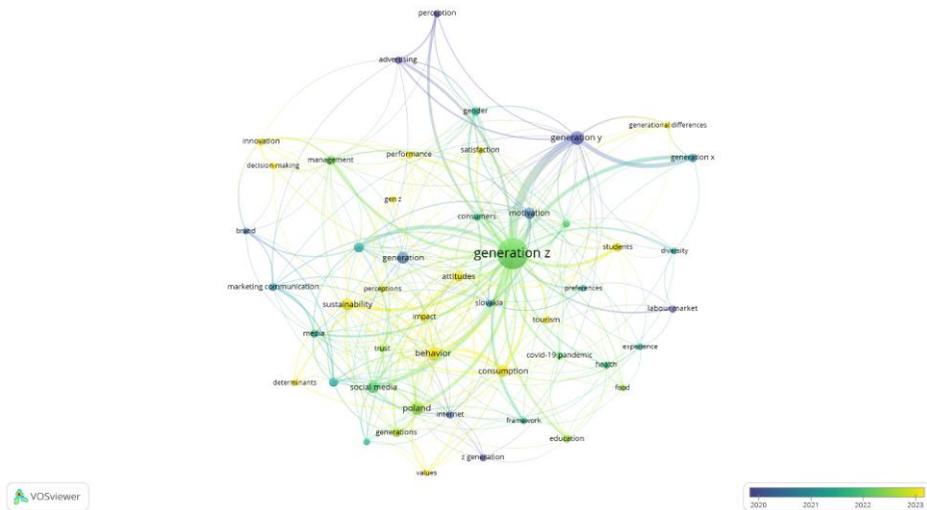
**Figure 1: Bibliometric map of keywords (Generation Z and V4) based on the Scopus database analysis**



Source: Own elaboration, 2026

The visualization from the Scopus database (Figure 1) reveals a complex network of relationships dominated by the central node "Generation Z" connected to three main thematic areas: **(I) Management and technologies:** A strong connection to keywords such as Industry 4.0, innovation, management, and knowledge indicates a strong focus on preparing young people for the digital transformation. **(II) Consumer behavior and marketing:** This area includes clusters around the terms consumption behavior, social media, brand, and marketing communication. The research here mainly focuses on the influence of influencers and digital platforms on purchasing decisions. **(III) Sustainability and values:** The cluster around the term sustainability and pro-environmental behavior confirms that environmental responsibility is a key topic in the V4 region.

**Figure 2: Network map of keywords (Generation Z and V4) based on the WoS database analysis**



Source: Own elaboration, 2026

The data analysis from the Web of Science database (Figure 2) complements the above findings with specific dimensions that are more prominently emphasized in this database: **(I) Labor market and intergenerational differences:** There are significant links between Generation Z, Generation Y, and the labor market. Research in this area focuses on value disparities and the expectations of young employees. **(II) Social awareness and education:** Topics related to education and specific segments, such as future doctors or university students, appear. **(III) Tourism and services:** This cluster is dominated by terms such as tourism and travel habits, which examine changes in the behavior of young travelers after the COVID-19 pandemic.

#### 4. CONCLUSION

The presented study provided a comprehensive view of the scientific discourse on Generation Z in the V4 countries through a bibliometric analysis of the Scopus and Web of Science databases. Within the quantitative evaluation first research question, Poland's dominant role was identified, accounting for more than half of the region's scientific output in the Scopus database and a significant share in the Web of Science database. The research showed that while Poland leads in absolute numbers, Slovakia and the Czech Republic demonstrate high qualitative stability, as evidenced by the nearly identical rate of indexation of their outputs in both key databases. In contrast, Hungary exhibits the lowest intensity of scientific research on this cohort within the observed region.

The synthesis of thematic areas the second research question revealed that scientific interest is dominated by three pillars: economic-marketing, environmental, and technological-work-related. The research confirms the specific consumer behavior of young people, who prefer digital platforms while maintaining a critical distance from traditional marketing. At the same time, the key role of sustainability was confirmed, with Generation Z in the region showing strong interest in nature protection and climate responsibility. In the workplace, this generation is characterized by openness to Industry 4.0 technologies while simultaneously facing risks associated with lower satisfaction and the threat of burnout in specific professions as reflected in recent studies.

The limitations of the presented study lie primarily in its methodological restriction to two selected scientific databases—Scopus and Web of Science—which may overlook relevant studies published in local journals not indexed in these global systems. Another limitation is the focus on English-language keywords, which may have excluded publications written exclusively in the national languages of the V4 countries without an English abstract or keywords. The analysis also concentrated on quantitative and thematic parameters, while a deeper qualitative comparison of the content of methodologies used in the analyzed articles was not the subject of this bibliometric processing.

Future research should focus on deeper comparative analysis between the V4 countries and Western European countries to identify specific regional deviations in the development of Generation Z values. A promising area remains the study of the impact of generative artificial intelligence on the educational and work habits of this cohort, which appears to be an emerging trend in the most recent publications. It would also be appropriate to expand the bibliometric analysis to include databases such as Google Scholar or specific repositories of national universities, thereby providing an even more detailed picture of research activity within local academic communities in Central Europe.

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## USING DIGITAL SOLUTIONS TO INCREASE THE EFFECTIVENESS OF EDUCATION FOR GENERATION Z

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**Abstract:** *The current educational environment is undergoing a dynamic transformation driven by technological advances and the emergence of Generation Z. This generation of digital natives requires a high degree of visualization and interactivity, which poses a challenge to traditional pedagogical approaches. The main objective of this article is to highlight the possibilities of using innovative software and hardware tools, specifically the CERAA and TEA Captiv systems, in educating Generation Z in the field of ergonomics. These technologies transform theoretical teaching into an engaging process using digital twins and real-time data. Quantitative analysis of study results between 2021 and 2026 confirms that the implementation of these tools leads to a significant increase in excellent grades and a decrease in failure rates. The results suggest that the synergy between mentors and modern technologies is key to the effective preparation of future industrial engineers.*

**Key words:** *Generation Z, digital education, ergonomics, educational effectiveness*

**JEL Classification:** *I21, I23, O33, M54*

### 1. INTRODUCTION

In areas requiring the integration of theory and practice, such as industrial ergonomics and work analysis, it is essential to integrate modern digital

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solutions that can meet these needs. The aim of this article is to highlight the possibilities of using innovative software and hardware tools in the education of Generation Z. We focus on the application of augmented reality and biomechanical analysis systems, specifically CERA and TEA Captiv tools, in the process of teaching ergonomics and work analysis. The article analyses how these technologies not only streamline the understanding of complex ergonomic relationships, but also transform teaching into an engaging process that resonates with the digital identity of the next generation of industrial engineers. The starting point is the concept of experiential learning, where digital twins of workplaces allow students to safely experiment with real industrial scenarios. This approach transforms passive information intake into an active cognitive experience, building more lasting professional competencies in line with Industry 4.0 principles.

## **2. LITERATURE REVIEW**

The current educational environment is undergoing a fundamental transformation driven by digitization, social change, and unlimited access to information. This change requires new approaches that previous generations did not know (Saraiva and Nogueiro, 2025). In the 21st century, agility is coming to the fore as an individual competence essential for success in a dynamic environment (Varga et al., 2025).

In the context of contemporary education and the labour market, we perceive generations as unique cohorts shaped by specific historical, social, and, above all, technological milestones (Gyurák Babel'ová et al., 2020). Traditionally, we divide them into Baby Boomers (born approximately between 1946 and 1960), who brought hard work and hierarchy to the process, followed by Generation X (1961–1980), perceived as a bridge between the analog and digital worlds, and Generation Y (Millennials, 1981–1995), who were the first to accept the internet as an integral part of their adolescence (Stareček et al., 2021). However, the current focus of attention is Generation Z (1995–2009), also known as "digital natives," for whom technology is not just a tool but a natural living space. Generation Alpha (2010–2025) is the first group in history to be fully shaped by artificial intelligence and the deep integration of digital solutions into everyday life from an early age (Stareček et al., 2021). Although many of its representatives are still of school age today, their arrival at universities and subsequently on the labour market in the near future will require a radical transformation of educational processes towards maximum personalization and technological agility. It is precisely this generational stratification that creates a fascinating mosaic of experiences, where the stability and deep knowledge of older generations meet the fierce agility, visual intelligence, and desire for immediate innovation of the youngest generations (Carvalho et al., 2022). Generation

Z, born in the era of digital technologies, brings specific technological skills and inclusive thinking to education and later to the workplace (Gyurák Babel'ová et al., 2020). However, unlike previous generations, educators and researchers express concerns about their lack of experience with higher-order critical thinking and their tendency to give up when faced with challenges. That is why it is essential to adapt teaching strategies to take advantage of their digital affinity while developing perseverance and deep analytical skills (Gao, 2025). Generation Z increasingly relies on technologies such as artificial intelligence, augmented reality (AR), and digital twins in their everyday lives and in education. Examples of successful applications include various software programs that allow students to visualize complex 3D models of various objects. Such solutions transform static information into immersive experiences, which is key for a generation that naturally gravitates toward visual stimuli (Suri et al., 2023).

The virtual environment of digital twins and augmented reality is not only used for teaching, but also for testing innovative procedures. Students can thus design methods that simplify work and at the same time improve monitored indicators in the field of safety (OHS) and ergonomics, thereby preventing risks in real-life operations. According to educational research findings, generative AI and AR can help students understand complex natural laws or human body systems through thought experiments and simulations adapted to the local context. This form of visualization not only increases engagement, but also helps overcome the barriers of traditional rote memorization (Leal Filho et al., 2024).

Current education systems face challenges in the form of subjective assessment and a lack of real-time feedback. For Generation Z, which naturally demands immediate results, this time lag is a barrier to progress (Seibert, 2021). However, the deployment of artificial intelligence directly addresses this problem: instead of waiting for a teacher's subjective assessment, students receive unbiased data immediately. Technology thus transforms static assessment into a dynamic process, where every mistake serves as an immediate point for improvement, which precisely meets young people's need for continuous and fair guidance (Arora and Damarla, 2025). At the same time, it appears that the use of these tools in education and training significantly streamlines work, creating space for individual mentoring, which is highly valued by Generation Z. These digital solutions do not serve as a substitute for humans, but as a tool to enhance interactivity and efficiency throughout the learning or training process. Their goal is not to replace human work, but to rid it of stereotypes and enrich it with elements that are key to Generation Z. Instead of lengthy processes, young people get exactly what they naturally seek: a high degree of visualization, an interactive experience, and immediate evaluation of results in real time. This approach creates a powerful synergy—technology provides "instant" feedback and a dynamic

environment, while the mentor or supervisor can focus on deeper connections and strategic leadership. The result is a process that is no longer perceived as a boring chore, but as a modern, visually engaging experience that responds to the digital habits of today's generation (Suri et al., 2023).

The effectiveness of education for Generation Z depends on the ability of institutions to integrate modern technologies such as augmented reality, AI, and digital twins into everyday practice. While technology provides the necessary speed and visualization, the key role of educators remains the development of critical thinking and resilience so that young people's digital affinity can be transformed into real professional competence (Funa and Gabay, 2026).

### 2.1 Comparative analysis of generations in education and technology

Table 1 summarizes the key differences between the baby boomer, X, Y, Z, and alpha generations, focusing on their approach to technology and educational needs based on the studies analysed.

**Table 1: Comparative analysis of generations**

<b>Generation:</b>	<b>Years of birth:</b>	<b>Technological skills</b>	<b>Educational preferences and approach:</b>
<b>Baby Boomers</b>	1946 - 1960	They adopt technologies selectively, preferring telephone or personal contact.	They prefer formal lectures and structured materials. They perceive education as a process of acquiring authority and expertise.
<b>Generation X</b>	1961 – 1980	They experienced the advent of PCs. They use technology pragmatically as a tool to increase productivity.	They require efficiency and a clear connection to practice. They are capable of independent study if they have clearly defined goals and rules.
<b>Generation Y</b>	1981 – 1995	The first generation with cell phones and social networks. Technology is part of their identity.	They seek meaning and flexibility. They prefer working together in groups, learning through play, and using apps to share information.
<b>Generation Z</b>	1995 – 2009	They have never known a world without the internet. Multitasking and smartphones are a natural extension of who they are.	They require visualization, immediate feedback, and instant solutions. They learn best through interactive simulations and video content.
<b>Generation Alpha</b>	2010 – 2025	Artificial intelligence and voice assistants have been a normal part of their reality since early childhood.	They expect highly personalized, AI-driven education. The boundary between the physical world and their digital twin is almost invisible to them.

Source: Own elaboration, 2026

Given that PI today and in the future cannot do without digital solutions, it is essential to transform this need into the educational process. One of the areas we have chosen is ergonomics and work analysis, which provide sufficient scope for linking theoretical knowledge and practical skills.

## **2.2 Ergonomic principles and the digital environment of Generation Z**

In its current form, ergonomics covers a wide range of topics that can be addressed in industrial practice. It can be used to study how employees and their workplaces interact in ways that affect all aspects of the workplace. Ergonomics includes workplace design, product design, environment, and personnel policy that takes into account the biomechanical, physical, and psychological needs of employees. This improves the efficiency and productivity of the work system while ensuring that the worker is safe, healthy, and satisfied. (Koirala, Nepal, 2022).

Ergonomics combines knowledge from psychology, sociology, anthropometry, physiology, engineering, industrial design, biomechanics, and draws on knowledge from several scientific disciplines. This naturally involves a large amount of data that needs to be collected, processed, and evaluated. A systematic approach to problem solving is necessary and characteristic of ergonomics. Ergonomics is generally known as the scientific study of human work and the application of scientific information about humans to the design of objects, systems, and environments (Gainer, 2008). Ergonomics encompasses many tools and methods used to evaluate the work environment and ensure the safety and comfort of employees. Currently, this mainly involves the use of augmented and virtual reality elements for more effective and vivid work analysis.

The role of ergonomics is to create a comfortable working environment for workers. With the current development of technologies used in Industry 4.0, such as simulations, virtual reality, and augmented reality, it is possible to create a virtual environment for any work process. The integration of Industry 4.0 technologies with ergonomics can therefore increase workplace efficiency. Ergonomists can use these simulations to identify risks or sources of discomfort that may affect real workers (Mostafa, 2023). Ergonomic analysis involves a wide range of methods, some of which are more subjective, some more objective, ranging from simple to complex. The suitability of methods is selected according to the specific needs of the selected company (Kováč, Szombathyová, 2010). Questionnaires with various evaluation factors are common, but more

sophisticated methods are also used, such as infrared light or ultrasound to analyse movement.

Initially, older methods were used, such as pen and paper, as information technology was still in its infancy. The situation is currently changing, as evidenced by Dempsey's 2019 research, which found an increase in the existence and use of computer applications. It has been shown that the frequency of use of software and pencil formats is equivalent for most of the research methods included (Gajšek et al., 2022).

The methods used to study and subsequently evaluate musculoskeletal strain are broadly classified into three categories (Goméz-Galán, 2017):

- **Indirect methods** – in the form of subjective assessment of working conditions by employees in a questionnaire, which is then analysed and evaluated. These methods are developed and verified by specialized researchers or research centres. The main benefits are low costs and professionally verified reliability, as they are developed and verified by specialized researchers. The disadvantage is the complexity of some questions and the need for statistical processing and ensuring the relevance of the results with a sufficiently large representative sample of company employees;
- **Semi-direct methods** – to use software solutions, it is first necessary to examine the working position and movements and record them using photographs or video recordings of the work process. These methods are less accurate than direct methods, but are used more in practice as they are less costly. The most time-consuming part is the interpretation of the recordings, and overall, the process of ergonomic analysis using semi-direct methods is more time-consuming;
- **Direct methods** – for measuring work positions using electronic sensors placed on the worker's body at specific points that are analysed. The sensors monitor angles, speed, and distance. The advantage of direct methods is high accuracy and objectivity, automation of data collection, and the ability to observe the course of variables over time. The biggest disadvantage is the discomfort of the worker, who is surrounded by cables and sensors, as well as the financial cost of the solution, which makes it more difficult to use in practice.

Based on a comparative analysis of generations (see Table 1), the generation we work with (Gen Z) requires immediate feedback and instant solutions. As this is a generation that was born with mobile phones in their

hands, the traditional approach to education is unattractive to them, and the constant innovation of the educational process through digital methods is no longer a challenge but a necessity. For this reason, we have incorporated interactive elements using augmented reality and smart technologies and sensors of the future into the teaching process.

One of the ergonomic simulations is the CERAA (Ceit ERgonomics Analysis Application) application, which enables independent assessment of physical strain in the workplace for industrial companies. It uses modern technologies such as tablets and augmented reality for more accurate assessment directly in real work environments, as shown in Figure 3. It comprehensively assesses administrative and manufacturing workplaces, manual handling of loads, and compliance with the latest legislative and technical standards, based on the height, weight, and work process of the worker (Asseco CEIT, a.s., 2024).

The CERAA (Ceit ERgonomics Analysis Application) software tool is designed to assess ergonomic strain during work activities based on an analysis of work positions and movement sequences. It uses digitally processed video recordings as a basis for the objective identification of postural configurations and the duration of exposure to stressful positions. CERAA enables the systematic quantification of the risk of musculoskeletal overload and the identification of critical work tasks. By linking to a virtual static model of the human body, it supports the analysis of movement ergonomics and the evaluation of the impact of proposed ergonomic measures. The tool can be used to optimize workplaces, work processes, and preventive measures in the field of occupational health and safety.

In addition to CERAA, a new HW-SW solution called TEA Captiv is being introduced into the process. The TEA Captiv platform is an integrated software tool designed for the synchronized collection, visualization, and analysis of multimodal data on human behaviour and movement in the work environment. The system enables the temporal linking of video recordings with biomechanical and physiological data from sensors, creating a comprehensive analytical framework for evaluating the ergonomics of movements. Based on the recorded data, it is possible to create a digital twin of an employee in the form of a biomechanical avatar that is synchronized with a real video recording of the activity performed. This connection enables detailed analysis of work positions, movement dynamics, and musculoskeletal strain, as well as simulation of alternative work scenarios and verification of ergonomic measures (teargo.com, ergonoma.com).

The implementation of digital tools such as CERAA and TEA Captiv in teaching directly responds to the cognitive profile of Generation Z, which

prefers visual and interactive forms of learning to passive text reception. These solutions allow students to immediately see the impact of ergonomic risks through digital twins and biomechanical data, turning theoretical knowledge into a tangible experience. The ability to simulate scenarios and receive real-time feedback removes the barrier of lengthy waiting times for evaluation, which is a key motivating factor for this generation. The use of this software not only streamlines the understanding of complex natural laws, but also prepares students to work with Industry x.0 technologies, thereby increasing their employability in the labour market. Digital interactivity thus replaces stereotypical teaching with an engaging experience that promotes deeper memorization and understanding of contexts.

### **3. DISCUSSION AND CONCLUSION**

The survey and comparative analysis of generations summarized in Table 1 clearly shows that Generation Z represents a specific group in the context of education with diametrically different needs than their predecessors. While older generations, such as Baby Boomers and Generation X, perceived education through the prism of authority, structure, and the gradual acquisition of knowledge, Generation Z, shaped by the ubiquitous internet, requires a radically different approach. As our findings show, the key difference is their need for immediate feedback and strong visualization. Traditional methods based on memorization and subjective evaluation are met with disinterest by these "digital natives" and are perceived as a barrier to progress. The introduction of interactive methods and advanced technologies, such as augmented reality and digital twins (CERAA or TEA Captiv tools), is therefore not an option but a necessity for maintaining the effectiveness of the educational process. These technologies provide students with the "instant" solutions and objectivity they naturally seek. Instead of passive listening, they become active participants in the process, where every mistake in the simulation serves as an immediate point for improvement without risk in real-world operations.

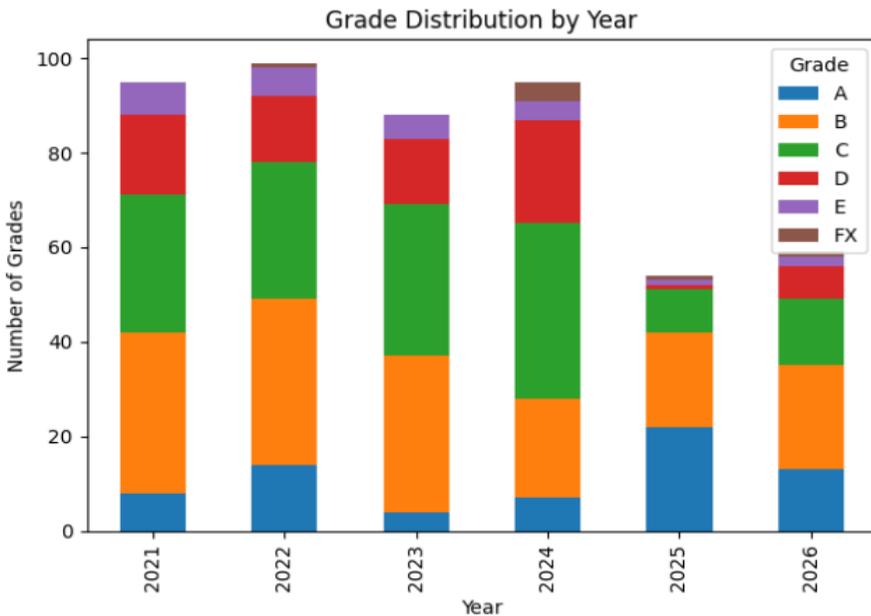
A quantitative analysis of students' academic results (see Figure 1) during the period when digital tools were gradually implemented into teaching reveals significant changes in the structure of academic results, specifically:

- The most striking phenomenon is the increase in the proportion of A grades, particularly in 2025 and 2026. This trend suggests that technological support (e.g., instant feedback in a digital environment) contributes to a better understanding of complex material among above-average students.

- Over the years, there has been a gradual decline in FX grades. The more intensive use of digital technologies allows students to use tools to identify gaps in their knowledge early on, thereby preventing them from failing the course.
- The year 2026 shows a balanced distribution between grades A, B, and C. This phenomenon may indicate that more accessible digital technologies are helping students with average academic performance achieve more consistent results, stabilize their performance, and eliminate falling into borderline grades (E).

The data confirm that modern technologies do not act merely as passive carriers of information, but as active factors supporting academic development. The shift towards better grades in recent years provides an empirical basis for the hypothesis of the added value of digitization in the higher education environment.

**Figure 1: Student grade distribution from 2021 to 2026**



Source: Own elaboration, 2026

In conclusion, it can be said that synergy between mentors and modern technologies is the path to successful education for the next generation. Technologies are taking on the role of providing fast data and visual experiences, creating space for educators to develop critical thinking and individual mentoring, which Generation Z highly values. Transforming education into a visually engaging and interactive experience is therefore a key prerequisite for effectively preparing Generation Z for the challenges of the future.

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## FROM EDUCATIONAL TREND TO CLASSROOM PRACTICE: REFLECTING ON GAMIFICATION-BASED MOTIVATION IN SCHOOL EDUCATION

*Matej TURANSKÝ*<sup>1</sup>

**Abstract:** *This paper examines gamification as a contemporary educational trend through a practice-oriented reflection on the MAXIMUS Erasmus+ project, which focused on enhancing student motivation and engagement in primary and secondary education. While gamification is frequently promoted as an effective response to motivational challenges, existing research highlights mixed outcomes and strong context dependency. The article addresses this gap by combining insights from academic literature with a project-based analysis conducted under real school conditions. The study discusses key opportunities and constraints associated with gamification, emphasizing design choices, teacher mediation, and contextual adaptability. The findings suggest that gamification should be approached as a pedagogical design challenge rather than a technological solution. By identifying transferable lessons from the MAXIMUS experience, the paper contributes to a more reflective understanding of how educational trends can be meaningfully translated into classroom practice.*

**Key words:** *educational innovation, gamification, motivation, school education, student engagement*

**JEL Classification:** *I21, I28, O30, O33*

### 1. INTRODUCTION

Student motivation and engagement remain enduring challenges in contemporary education, particularly in primary and secondary school context where traditional instructional strategies often fail to sustain learners's interest and active participation. Research indicates that maintaining students's engagement has critical implications for learning outcomes, yet motivations tend to fluctuate and decline when instructional approaches lack relevance or personalization. (Ratinho, E. & Martins, C. 2023).

In response to these challenges, gamification—the integration of game mechanics, aesthetics, and design principles into non-game educational environments—has emerged as a prominent trend aimed at enhancing student motivation and engagement. (Ouazizi et al. 2024) Studies suggest that gamification strategies such as points, badges, and leaderboards can

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positively influence motivation and engagement, although the effects often depend on design choices and individual learner characteristics. (Ratinho, E. & Martins, C. (2023).

Despite its apparent potential, the implementation of gamification in educational settings has revealed a persistent gap between theoretical promise and classroom reality. Empirical and review studies highlight mixed outcomes, as gamification can lead to short-term engagement spikes but does not necessarily translate into sustained intrinsic motivation or improved performance when design and integration are superficial. (Jaramillo-Mediavilla *et al.*, 2024) Moreover, research underscores the importance of aligning gamified designs with pedagogical goals and learner needs, rather than indiscriminately applying game elements. (Cabello *et al.*, 2021)

At the same time, policy initiatives such as the Erasmus+ Key Action 2 (KA2) framework seek to stimulate strategic cooperation for innovation and the exchange of good practice in education across Europe. This includes support for collaborative projects aimed at developing and implementing innovative educational practices that address persistent challenges through transnational partnerships. (European Commission, 2023)

Within this policy and research landscape, the MAXIMUS project ("Maximising learners' motivation, engagement and learning through gamification") represented a practitioner-informed effort to translate educational trends into a scalable motivation system for primary and secondary schools, under real-world institutional constraints. (Klaster regionálneho rozvoja, 2021) Although designed as a pedagogical innovation project rather than a controlled intervention study, MAXIMUS provides rich documentation of challenges, design decisions, and inspirational practices that illuminate the complexities of applying gamification meaningfully in school contexts.

By reflecting on the theoretical background of motivation and gamification alongside practical experiences from the MAXIMUS initiative, this article contributes to the ongoing discourse on how educational trends intersect with practice-based challenges. Its aim is to identify design principles and implementation insights that can inspire future efforts to enhance motivation in educational settings without overstating the universal effectiveness of gamified tools.

## **2. PROBLEM FORMULATION: MOTIVATION AND ENGAGEMENT IN SCHOOL EDUCATION**

In primary and secondary school settings, students's willingness to actively participate in learning activities significantly influences not only

academic performance but also long-term attitudes toward education. However, sustaining motivation remains a persistent challenge, particularly in increasingly heterogeneous classrooms where students differ in abilities, interests, learning styles, and socio-cultural backgrounds (Ratinho & Martins, 2023).

Traditional approaches to student motivation, often based on external rewards or standardized instructional strategies, have shown limited effectiveness in addressing these diverse learner needs. Research indicates that such approaches may produce short-term engagement but frequently fail to foster deeper, intrinsic motivation necessary for sustained learning (Cabello *et al.*, 2021). As a result, educators and policymakers continue to seek innovative solutions capable of enhancing engagement while remaining pedagogically meaningful.

A critical issue identified in the literature is the frequent misalignment between gamification concepts and classroom realities. Many gamified solutions prioritize technological features or reward mechanisms without sufficient consideration of pedagogical integration, teacher preparedness, or curricular constraints (Cabello *et al.*, 2021). Consequently, such implementations risk reducing motivation to extrinsic incentives, which may undermine long-term engagement and learning quality.

Furthermore, motivation in school education cannot be understood as a static or universal construct. Engagement is shaped by complex interactions between learner expectations, instructional design, teacher facilitation, and institutional conditions. Studies emphasize the importance of learner-centered design and adaptability, particularly in educational games and gamified systems, where student engagement varies according to individual preferences and learning contexts (Ratinho & Martins, 2023).

From a practical perspective, these challenges are especially evident in innovation projects operating under real-world constraints. Some Erasmus+ cooperation projects, such as those supported under Key Action 2, aim to translate educational trends into scalable and transferable practices while navigating institutional, organizational, and pedagogical limitations (European Commission, 2023). Within this framework, the MAXIMUS project, coordinated by the Klaster regionálneho rozvoja, addressed student motivation through a gamification-based approach designed specifically for primary and secondary education (Klaster regionálneho rozvoja, 2021).

The problem addressed in this article, therefore, lies not in questioning whether gamification can influence motivation, but in understanding how motivational tools can be designed and implemented under real educational constraints. This requires shifting attention from generalized claims of effectiveness toward a design-oriented perspective that considers contextual adaptability, pedagogical alignment, and practical feasibility.

Such an approach enables a more nuanced understanding of motivation as a dynamic and context-dependent challenge in school education, forming the basis for the subsequent analysis of trends, challenges, and inspirations derived from the MAXIMUS project experience.

### **3. GAMIFICATION AS AN EDUCATIONAL TREND: OPPORTUNITIES AND CONSTRAINTS**

Gamification has emerged as a prominent educational trend in response to persistent challenges related to student motivation and engagement across educational levels. It is commonly defined as the use of game design elements in non-game contexts with the aim of influencing user behavior and experience. One of the most widely cited conceptualizations of gamification emphasizes its role in enhancing engagement rather than replacing pedagogical content, thereby positioning it as a complementary educational approach rather than a standalone solution. (Deterding et al., 2011)

A key opportunity associated with gamification lies in its potential to promote active learning and sustained engagement. Empirical research suggests that gamified learning environments may increase learners' persistence, enjoyment, and task involvement when game elements are meaningfully aligned with learning objectives. These effects are particularly relevant in school education, where maintaining students' attention and motivation represents an ongoing challenge. (Ratinho, E. & Martins, C. (2023).

Another frequently discussed advantage of gamification is its capacity to support personalization and learner differentiation. Game-inspired systems can be designed to accommodate different learning paces, preferences, and skill levels, thereby aligning with inclusive education principles. From an instructional design perspective, gamification may enable educators to structure learning experiences that respond more flexibly to diverse learner needs. (Lee & Hammer, 2011)

Despite these opportunities, research also highlights significant constraints and risks associated with the educational use of gamification. Several studies indicate that gamification does not guarantee positive motivational outcomes and may even have adverse effects if implemented superficially or without pedagogical coherence. For example, reward-focused systems emphasizing points or competition may undermine intrinsic motivation or create disengagement among certain learner groups. (Sánchez-Mena & Martí-Parreño, 2017)

A further limitation concerns the translation of gamification concepts into everyday classroom practice. While gamification frameworks are often developed under idealized conditions, teachers frequently operate within

strict curricular structures, limited time resources, and varying levels of digital competence. These constraints can hinder the meaningful integration of gamified tools into regular teaching practice, reducing their effectiveness or sustainability. (Sánchez-Mena & Martí-Parreño, 2017)

Moreover, motivation and engagement are increasingly understood as context-dependent and dynamic phenomena, shaped by interactions between learners, instructional design, teacher mediation, and institutional conditions. As a result, gamification cannot be treated as a universally applicable solution but must be adapted to specific educational contexts. Studies emphasize that learners' responses to gamified elements vary considerably depending on age, prior experience, and learning environment. (Zainuddin et al., 2020)

Taken together, these findings suggest that gamification should be approached not merely as a technological trend but as a design and implementation challenge embedded in educational practice. This perspective calls for reflective, theory-informed, and context-sensitive approaches to educational innovation rather than uncritical adoption of popular trends. Such an understanding is particularly relevant in the context of collaborative innovation initiatives, including Erasmus+ cooperation projects, which aim to experiment with new approaches while operating under real institutional constraints.

Against this backdrop, the MAXIMUS project represents a practice-based attempt to operationalize gamification principles within authentic school environments. By focusing on flexibility, pedagogical alignment, and adaptability, the project provides a concrete example of how gamification can be translated from educational trend to classroom practice under real-world conditions. (Klaster regionálneho rozvoja, 2021)

#### **4. PROJECT-BASED REFLECTION: THE MAXIMUS ERASMUS+ EXPERIENCE**

The MAXIMUS project represents a practice-oriented response to the growing emphasis on gamification as a strategy for enhancing motivation and engagement in school education. Implemented within the framework of the Erasmus+ Key Action 2 programme, the project aimed to design and pilot a motivation system tailored specifically to the needs and constraints of primary and secondary schools. Unlike experimental or laboratory-based studies, MAXIMUS was developed and implemented under authentic educational conditions, involving real classrooms, teachers, and institutional limitations. (Základná škola BESST, 2023)

A defining characteristic of the MAXIMUS initiative was its emphasis on designing motivation as a pedagogical process rather than a technological feature. The project did not seek to introduce a single, rigid gamified

solution but instead focused on developing a flexible framework that could be adapted to different school contexts. This approach reflects a deliberate departure from one-size-fits-all gamification models, acknowledging that motivational strategies must align with curricular requirements, teacher competencies, and learner diversity. (Klaster regionálneho rozvoja, 2023)

The project incorporated multiple components, including a digital platform, methodological guidelines for teachers, and supporting materials designed to facilitate classroom integration. These elements were intended to support educators in applying gamification principles in ways that complemented existing teaching practices rather than replacing them. By prioritizing usability and adaptability, the project addressed a commonly identified barrier to gamification adoption—namely, the difficulty teachers face when integrating new tools into already demanding instructional environments. (Klaster regionálneho rozvoja, 2023)

Throughout its implementation, the MAXIMUS project encountered a range of challenges that reflect broader constraints discussed in the literature. One such challenge concerned the varying levels of teacher readiness and digital competence, which influenced how gamification elements were interpreted and applied in practice. While some educators embraced the motivational framework as an opportunity for innovation, others required additional support to align gamified activities with pedagogical objectives and classroom routines. This variability underscores the importance of teacher mediation in determining the effectiveness of motivational tools. (Institute of Entrepreneurship Development, 2023)

Another notable challenge related to maintaining a balance between engagement and cognitive load. The project experience demonstrated that excessive or poorly aligned game elements could distract from learning objectives rather than enhance them. As a result, MAXIMUS emphasized moderation and purposeful design, encouraging educators to view gamification as a supportive structure rather than as an end in itself. This insight aligns with broader critiques of superficial gamification and reinforces the need for pedagogical coherence. (Klaster regionálneho rozvoja, 2023)

Despite these constraints, the MAXIMUS experience also generated several inspirational insights relevant to educational practice. One key lesson was the value of modular design, which allowed schools to adopt and adapt specific elements of the motivation system according to their individual needs and capacities. This modularity enhanced the project's transferability and contributed to its recognition as an example of good practice within broader educational networks. (Klaster regionálneho rozvoja, 2023)

Beyond the formal project duration, elements of the MAXIMUS approach were further applied in standalone educational initiatives, demonstrating the sustainability and adaptability of the underlying design principles. These follow-up applications suggest that the project's primary contribution lies not in a single tool or platform, but in the articulation of a design logic that can inform future motivational strategies in school education. (MAXIMUS, 2023)

Overall, the MAXIMUS Erasmus+ experience illustrates how gamification can be translated from an educational trend into a context-sensitive motivational framework when grounded in pedagogical reflection and real-world constraints. Rather than offering definitive solutions, the project provides a practice-based perspective on the conditions under which gamification can support motivation and engagement in school settings. These insights form the basis for the broader discussion of transferable lessons presented in the following section.

## **5. DISCUSSION: TRANSFERABLE LESSONS FOR EDUCATIONAL PRACTICE**

The MAXIMUS project experience offers several transferable lessons that extend beyond the specific context of an Erasmus+ initiative and are relevant to broader educational practice. When interpreted alongside existing academic literature, these lessons highlight critical conditions under which gamification-based motivation strategies can contribute meaningfully to teaching and learning rather than remaining superficial or short-lived interventions.

One of the central lessons emerging from the project is that motivation should be treated as a design challenge rather than a technological feature. While gamification is often associated with digital platforms or game mechanics, both research and practice suggest that motivational impact depends primarily on how these elements are pedagogically embedded. Studies emphasize that gamification enhances engagement only when it supports meaningful learning activities and aligns with instructional goals, rather than functioning as an isolated reward system. (Deterding et al., 2011)

A second transferable insight concerns the importance of context sensitivity and adaptability. The MAXIMUS project demonstrated that schools differ significantly in terms of institutional capacity, teacher readiness, and learner characteristics. This finding reinforces academic arguments that gamification cannot be universally applied in identical forms, as learners's responses to gamified elements vary across age groups, learning environments, and prior experiences. (Klaster

regionálneho rozvoja, 2023) Effective motivational design therefore requires flexibility and modularity, allowing educators to adapt tools and strategies to local conditions. (Lee & Hammer, 2011)

The MAXIMUS experience also highlights the necessity of moderation in the use of game elements. Excessive reliance on points, competition, or visual stimuli may increase cognitive load or distract learners from core educational content. Both the project outcomes and existing studies suggest that gamification should support, rather than dominate, the learning process. This reinforces critical perspectives in the literature that caution against over-gamification and emphasize the need for balance between engagement and instructional clarity. (Jaramillo-Mediavilla et al., 2024)

From a broader policy and innovation perspective, the MAXIMUS project illustrates the value of project-based experimentation in educational development. Erasmus+ cooperation initiatives provide a structured environment in which educational trends can be tested, adapted, and critically assessed under real-world conditions. Rather than producing definitive solutions, such projects generate practical insights that inform future design and implementation efforts. This iterative approach aligns with contemporary views on educational innovation as a continuous learning process rather than a one-time intervention.

Taken together, these lessons suggest that the inspirational potential of gamification lies not in its novelty, but in its thoughtful integration into pedagogical practice. Transferable value emerges when motivational strategies are grounded in educational theory, adapted to contextual realities, and supported by teacher engagement. The MAXIMUS project thus contributes to a growing body of evidence advocating for reflective, design-oriented approaches to educational innovation—approaches that prioritize sustainability, adaptability, and meaningful learning over rapid adoption of trends.

## **6. CONCLUSION**

This article set out to examine gamification as a contemporary educational trend through the lens of practical implementation, with a particular focus on challenges, opportunities, and sources of inspiration for educational practice. Drawing on relevant academic literature and a project-based reflection on the MAXIMUS Erasmus+ initiative, the paper contributes to ongoing discussions on how motivational strategies can be meaningfully integrated into primary and secondary education.

The analysis confirms that while gamification holds considerable potential for enhancing student engagement, its effectiveness is neither automatic nor universal. Academic research consistently demonstrates that

gamification outcomes depend on contextual factors such as pedagogical alignment, learner characteristics, and instructional design choices rather than on the mere presence of game elements. These findings reinforce the view that gamification should be approached as a pedagogical and design-oriented challenge rather than as a purely technological solution. (Deterding et al., 2011)

The project-based reflection on the MAXIMUS experience further illustrates how these theoretical considerations manifest in real educational environments. Implemented under authentic school conditions, the project highlighted both the constraints educators face - such as limited time, curricular rigidity, and varying levels of digital competence - and the importance of flexibility, modularity, and teacher mediation in sustaining motivation. These insights support existing critiques of superficial gamification and emphasize the necessity of contextual adaptation in motivational design. (Klaster regionálneho rozvoja, 2023)

From a broader perspective, the paper underscores the value of Erasmus+ cooperation projects as experimental spaces for educational innovation. Such initiatives allow educational trends to be tested, refined, and critically assessed within diverse institutional contexts, generating transferable insights rather than prescriptive solutions. This aligns with contemporary approaches to educational development that view innovation as an iterative and reflective process grounded in practice. (European Commission, 2023)

In conclusion, the contribution of this article lies in demonstrating that the inspirational value of gamification in education emerges not from its novelty, but from its thoughtful, context-sensitive integration into pedagogical practice. By bridging educational trends with real-world implementation experience, the paper supports a more critical and reflective approach to motivation-focused innovation in school education.

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# How Generation Z perceives access to education and capacities in the V4 region

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## About Project

This project aims to address the capacity crisis in education and bridge the gap between Generation Z's expectations and the outdated educational practices in the V4 region (Czech Republic, Hungary, Poland, Slovakia). By fostering collaboration among eight partners, the project seeks to develop innovative solutions through comprehensive research, online workshops, and an international conference (CTIE). The findings will be shared widely via a dedicated online platform, providing valuable insights to policymakers, educators, and the public. This initiative will not only enhance Gen Z's readiness for the labor market but also foster regional collaboration, improve education systems, and promote international networking.



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