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EU PROGRAMS AS A TOOL FOR ENHANCING UNIVERSITY POTENTIAL IN RESPONSE TO SOCIAL AND EDUCATIONAL TRANSFORMATIONS

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Purpose: the article aims to highlight the influence of projects co-financed by the European Union on university development and the enhancement of their educational offerings.
Design/methodology/approach: the study employed traditional literature review methods and explored publicly available information sources. The collected data underwent critical evaluation, followed by a synthesis of findings using a deductive approach.
Findings: 1. Revolution 5.0 emphasizes the importance of integrating technology and humanistic values in education, personal life and work, calling on universities to adapt by fostering social competencies and using advanced technologies. 2. EU programs such as POWER and FERS play a key role in supporting universities by funding infrastructure, technology and staff development, enabling them to meet the demands of rapid technological and social change without overburdening their budgets. 3. Through the strategic use of EU funds, universities can streamline educational programs and implement large-scale projects that would otherwise be financially unattainable.
Originality/value: drawing the attention of those responsible for university management to: the need to change the approach to the educational process, which requires combining advanced technological skills with social skills, and the need for universities to participate in FERS programs in order to relieve the burden on their own budgets and focus on areas with the greatest potential for development.
Keywords: Education 5.0, EU projects, universities, public management.
Category of the paper: viewpoint.

1. Introduction

As two interpenetrating sectors, the contemporary higher education system and the labour market are constantly facing new challenges. Technological development, generational differences (e.g., in the teacher-student or boss-employee relationship), and the changing demand for key competencies influence modern education.

At the stage of Industry 4.0, which focused on process improvements and efficiency, higher education faced numerous challenges, including the ongoing digital transformation. According to P. Chmielecki, the challenges in the education sector should also include aspects related to the need for professionalisation of study programs and the phenomenon of staff degradation (Chmielecki, 2021). The expression of the education sector's challenges is Education 4.0, which responds to the transformations occurring in the industry. It requires universities to apply advanced technologies and automation in educational processes and to prepare students to function in a society of ubiquitous digital technologies (Juszczyk, 2023). Universities are therefore faced with the necessity not only to implement new technologies, including information and communication technologies, but also to handle them smoothly and integrate them into didactic, research, and managerial processes (Mazurek, 2019).

Although many publications are devoted to Industry 4.0 and its impact on transformations in various sectors, Industry 5.0 and Education 5.0 are already on the horizon, bringing new challenges for institutions involved in the education process. These changes will require greater adaptation and innovation to meet growing demands and dynamically changing realities. Technological progress and its subsequent transformations, along with the resulting social and educational changes, are reflected in the available EU programs. These programs give universities a better chance of preparing for upcoming challenges without fully burdening their budgets.

2. Technological transformation and its impact on social and educational change

One of the primary driving forces of progress has been the pursuit of reducing human effort in work. This drive, associated with emerging new technologies that significantly impact economic growth, production, and lifestyle changes, is called the Industrial Revolution (Mathur et al., 2022). Currently, five industrial revolutions are distinguished, each influencing not only industry but also education and society.

Following industrial revolutions, transformations occur in other sectors as well, such as Health 4.0 (Al-Jaroodi et al., 2020), which marks a shift from mass, reactive patient care to individualised, proactive healthcare (Bagaria, 2020); Construction 4.0, which involves the adaptation of industrial principles and technologies to the entire supply and value chain in the construction sector (Nagy et al., 2021); or the already mentioned Education 4.0 (Mukul, Büyüközkan, 2023). The table below (Tab. 1) succinctly captures the impact of technological progress on industry, education, and society.

Table 1.
Impact of technological progress on industry, education, and society

Revolution	Technology	Industry	Education	Society
1.0 - industrial	Mechanical production, steam power	The transition from an agrarian economy to an industry using steam to mechanise production and transportation	1.0—essentialised: a process based on the unilateral transfer of knowledge to a small group of students. The teacher has full authority over the class, students remain passive, and knowledge is given by the teacher and then reproduced by the student	1.0 Hunter-gatherer: a group of people engaged in gathering or hunting
2.0 - technological	Electricity, assembly line (automotive development, among others), internal combustion engine production	Electrification of production facilities, mass production	2.0 Education system based on testing knowledge through exams	2.0 Agricultural: a group of people leading a sedentary lifestyle focused on farming
3.0 - digital	Computer systems, electronics	Automation of production	3.0 Teacher acts as a facilitator, a guide in the learning process using digital tools to transfer knowledge. Methods used: project problems, cooperative learning, global projects	3.0 Industrial: a hierarchical society divided into social classes
4.0 - Internet/ information	IoT (internet of things), cloud computing, AI (artificial intelligence), among others	Emergence of smart factories using digital technologies to create intelligent products and processes	4.0 Use of modern technologies in the teaching process, use of Internet resources	4.0 Informational: significant technology impact on daily life (e.g., use of technology in daily communication)
5.0 - intelligent manufacturing	Digital twins, advanced data analysis, AI (artificial intelligence) development, among others	Two dimensions: 1. Collaboration between robots and humans (interpenetration of the virtual and real worlds) 2. Ensuring a balance between the environment, industry and economics with sustainability in mind	5.0 Emphasises the importance of social and emotional students development putting emphasis on the results achieved	5.0 Human-centered society that uses technology and automation to meet the challenges of the 21st century

Source: Grądzki, 2021, p. 139; Pilevari, Yavari, 2020, pp. 44-51, Kalaichelvan, Subramanin, 2023, pp. 52-55; Vall, 2019, pp. 13-18; Heijden, 2023.

Technological evolution drives significant changes in industry and society. Emerging technologies, manifested as industrial revolutions, have a profound impact on shaping the world. Each industrial revolution builds upon the achievements of its predecessors, creating

a foundation for subsequent transformations. Technological advancements inevitably bring about changes in education and society.

Similar to the Industrial Revolution 5.0, the concept of Education 5.0 is emerging in the academic sphere. This relatively new concept is evidenced by the limited number of articles addressing the topic in the Scopus database—only fourteen were published between 2019 and 2022 (Andres et al., 2022). Although industrial revolutions do not fully align with educational revolutions, the relationship with societal transformations remains debated.

For instance, Professor M. du Vall identifies Society 1.0 as a community of hunter-gatherers that transitioned into a sedentary, agriculture-centered society (Society 2.0) (Vall, 2019). Other researchers (e.g., Turečková et al., 2023) consider the birth of Society 1.0 to coincide with the first industrial revolution, marked by the transition from an agriculture-based economy to an industrial economy powered by steam energy. Subsequent technological transformations fostered the development of industrial Society 3.0, followed by information-driven Society 4.0 (Ferreira, Serpa, 2018).

In the literature, Society 4.0 is also referred to as a digital or smart society. Its defining characteristic is the seamless integration of technology, automation, and digitalisation into various aspects of life (Turečková et al., 2023). On the foundations of the extensively described 4.0 revolutions, 5.0 revolutions are being shaped. Society 5.0 is defined as a data-driven society leveraging technological advancements to improve quality of life and address social challenges (Yunindanova, 2022).

Generational changes also reflect societal transformations. Generation Z, comprising individuals born after 1995, has distinct expectations and preferences compared to previous generations. Education 5.0 integrates advanced technologies like artificial intelligence with collaborative (cooperative) learning and practical experiences. This new era in education emphasises the importance of leveraging modern technologies in the learning process while focusing on developing social skills, such as critical thinking, interdisciplinary problem-solving, and adaptability to rapidly changing environments (Shahidi Hamedani et al., 2024).

Addressing the challenges posed by the Social and Educational Revolution 5.0 requires organisational and personal flexibility and financial investment. Many initiatives support the organisational development of universities within the framework of projects and programs co-financed by the European Union.

3. Support within EU Programs

One of the European Union's primary financial instruments has been the European Social Fund (ESF), aimed at supporting employment, social development, and enhancing social and economic cohesion within member states. In Poland, the ESF has been implemented through

Operational Programs, the most well-known of which is the Operational Program Knowledge Education Development (PO WER). This program focused on providing support in the areas of education, employment, and social integration. Another program, implemented at the regional level and aimed at local development, is the Regional Operational Programs (RPO). For the 2021-2027 financial perspective, the European Social Fund has been replaced by the European Fund for Social Development (pol. FERS/ang. ESF+), which continues the objectives of the ESF while placing greater emphasis on the European Union's current priorities, such as the green transition, digitalisation, and social equality and inclusion.

The goals of the European Social Fund and its successor, the European Fund for Social Development, are embedded in the core documents and strategic frameworks of the European Union. Among the most significant are:

- The Treaty on the Functioning of the European Union (TFEU): article 162 specifies that the ESF aims to promote economic, social, and territorial cohesion within the European Union.
- The European Union's Strategy: currently, the EU's Strategic Agenda for 2024-2029 is in effect. This document outlines three priorities: a free and democratic Europe, a strong and secure Europe, and a prosperous and competitive Europe. The latter focuses on increasing competitiveness, fostering green and digital transitions, promoting an innovation-friendly environment, and driving joint progress. The strategy emphasises investment in human skills, lifelong learning, and education while encouraging talent mobility within and beyond the EU.
- Transforming Our World: The 2030 Agenda for Sustainable Development: adopted in 2015 by the United Nations, this agenda calls for member states to focus on eradicating poverty in all its forms while achieving economic, social, and environmental goals. It sets 17 Sustainable Development Goals (SDGs) with 169 associated tasks. The fourth goal, directly linked to education quality, is to "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". Within this goal, seven specific targets are to be achieved by 2030. Poland's response to the agenda is the Strategy for Responsible Development, which aims to create conditions for increasing citizens' income while fostering social, economic, and environmental cohesion. This strategy places people at its centre, emphasising human and social capital as the key to achieving its three detailed objectives.
- The European Green Deal: presented in 2019, the Green Deal encompasses legislative proposals related to ecological transformation, including climate, energy, transport, and tax policies. The European Green Deal envisions the EU becoming the world's first climate-neutral region by 2050. It aims to reduce pollution and restore a healthy balance in nature and ecosystems.

The European Social Fund (ESF) program and the European Fund for Social Development (FERS) are part of the established policies of the European Union. Thanks to funding from these funds, among others, higher education institutions can modernise their curricula, support teaching staff and students, and introduce innovative solutions adapted to the requirements of the modern world and minimise generational differences in technological aspects, speed of obtaining information, or teaching/learning models.

4. Support from EU funds to enhance university potential

Below is a characterisation of the activities of three public universities related to the implementation of projects co-financed by EU funds. The review focused on the top three universities listed in the "Academic Universities Ranking 2024" published on the Perspektywy website (these universities have consistently maintained their top positions). The analysis utilised this ranking due to its significant role in influencing prospective students' choices of higher education institutions. Additionally, the ranking considers key areas of academic activity, such as research, quality of education, internationalisation, and innovation.

The analysis covered projects acquired over the past five years, examining their funding sources, project objectives, and budgets. Selected projects focused on enhancing teaching competencies and were therefore targeted at the academic community. The universities are characterised below in the order of their ranking, starting with the top-ranked academic university in 2024.

4.1. University of Warsaw (UW)

Project name: program of integrated actions for the University of Warsaw development.
Source: Operational Program Knowledge Education Development (POWER).
Duration: 2.04.2018- 31.12.2023.
Budget: 41 239 759,83 PLN.
Objective: to develop and implement mechanisms aimed at teaching excellence and improving university management processes.
Beneficiaries: 9,159 individuals (including 5,368 students, 894 doctoral candidates, and 2,897 administrative and managerial staff).
Key Activities/Outcomes:

- introduction of new study programs supporting interdisciplinary research projects and English-language programs,
- IT initiatives, such as the creation of the SAD browser for integrating educational data,

- a wide range of specialised training and workshops focusing on soft skills for university staff, including the UW Deans' Academy (management skills support), language courses, soft skills workshops, and specialised training such as computer courses,
- a comprehensive offering of courses for students, covering areas such as digital skills, analytical competencies, and entrepreneurship.

Project name: Teaching excellence of universities.
Source: Operational Program Knowledge Education Development (POWER) + the Ministry of Education and Science - Excellence in University Teaching.
Duration: academic year 2022/2023.
Budget: 711,730 PLN.
Objective: To support organisational changes, improve the quality of teaching, and enhance processes and tools for ensuring teaching quality.
Beneficiaries: approximately 370 academic teachers and administrative staff.
Key Activities/Outcomes:

- establishment of a quality teaching advisory point in the office of educational innovation, serving a consultative and advisory role,
- creation of a best practices database, including examples related to teaching innovation,
- development of the Deans' Collaboration Platform, a resource compiling diverse materials on the teaching process,
- introduction of new tools for evaluating teaching activities,
- training sessions for academic teachers to enhance their competencies.

Project name: University for Everyone - Level Up.
Source: Operational Program Knowledge Education Development (POWER).
Duration: 01.2020-09.2023.
Budget: 14,977,739.70 PLN.
Objective: to enhance existing and develop innovative solutions to increase the accessibility of education for individuals with disabilities at the UW.
Beneficiaries: students with disabilities, teaching staff, and administrative personnel.
Key Activities/Outcomes:

- acquisition of 3 specialised buses to ensure accessible transportation,
- equipping the main library, selected departmental libraries, and laboratories with specialised equipment to improve independence in studying and working for individuals with disabilities,
- dissemination of knowledge and standards related to accessibility (training sessions for UW staff to raise awareness about removing barriers in studying and working for individuals with disabilities),

- launching a tactile maps laboratory for visually impaired individuals,
- expansion of the eBON system with new functionalities,
- reconstruction of the passageway at the UW, including the installation of an elevator.

4.2. Jagiellonian University in Krakow

Within the framework of the IntegratedUJ strategic project, the university is implementing two projects, Key to the future - Comprehensive program for the development of education to meet the needs of UJ's key industries, and Teaching Engagement Development (TED) - University teachers and doctoral students facing the challenges of the future.

Project name: Key to the Future - Comprehensive Program for Developing Education for Key Industries at Jagiellonian University.

Source: European Social Fund Plus, European Funds for Social Development (FERS).

Duration: 01.01.2024 – 30.06.2029.

Budget: 21,856,519.74 PLN (18,036,000.09 PLN from the EU).

Objective: to adapt the Jagiellonian University's educational offerings to meet the needs of economic development and green and digital transformation by developing study programs aimed at training future professionals for key industries, such as renewable energy, agriculture and food production, aerospace, and transportation.

Beneficiaries: 1,334 individuals (1,185 students and 149 faculty members of Jagiellonian University).

Key Activities/Outcomes:

- modification of existing or creation of new educational programs across 8 faculties,
- additional initiatives for students, including study visits, training, internship programs, and measures to reduce the phenomenon of early dropout in project-covered fields of study,
- improving the qualifications of academic teachers involved in teaching new or modified programs, particularly in areas such as digital skills, green transformation, and universal design.

Project name: Teaching Engagement Development (TED): Academic Teachers and Doctoral Candidates Facing Future Challenges.

Source: European Social Fund Plus, European Funds for Social Development (FERS).

Duration: 01.01.2024 – 30.06.2029.

Budget: 9 002 537,50 PLN (7 428 893,95 PLN from the UE).

Objective: to adapt the university's offerings to the needs of economic development and green and digital transformation by implementing initiatives to enhance the qualifications and competencies of teaching staff (including doctoral candidates) in the areas of teaching (including the use of modern teaching methods and methodologies), digital transformation, and green transformation.

Beneficiaries: 620 individuals (120 doctoral candidates, 500 academic staff members from Jagiellonian University).
Key Activities/Outcomes:
Activities for doctoral candidates:

- mandatory participation in three training sessions on teaching competencies, three sessions on digital skills, one session on awareness and skills development for green transformation, and one session on entrepreneurship, commercialisation of research outcomes, and other substantive competencies (a total of 80 teaching hours),
- after completing the training, additional support includes domestic and international internships as well as study visits.

Activities for academic staff:

- mandatory training in three areas: teaching, digital transformation, and green transformation,
- after completing the mandatory training, participants can join specialised training such as Academic Teaching Excellence, Intercultural Communication, and subject-specific courses,
- support also includes international internships, study visits, and mentoring involving individual training sessions.

Project name: Excellent University – Education for the Economy.
Source: European Funds for Social Development (FERS).
Duration: 1.07.2024 – 1.01.2029.
Budget: 34 615 484,74 PLN (28 564 698,01 PLN from the EU).
Objective: o develop the educational offerings of Jagiellonian University to meet the needs of the economy, labor market, and green and digital transformation through the implementation of a comprehensive support program for students and teaching staff.
Beneficiaries: students and teaching staff.
Key Activities/Outcomes:

- creation of new or modification of existing educational programs across 13 faculties in collaboration with employers, practitioners, and other entities operating in the socio-economic environment,
- implementation of additional educational components, including practical elements,
- measures aimed at reducing the phenomenon of early dropout from studies,
- development of qualifications and competencies of teaching staff through participation in courses, training sessions, internships, and study visits.

Project name: Responsible Support and Sustainable Development.
Source: Operational Program Knowledge Education Development (POWER).
Duration: 01.2020-10.2023.
Budget: 11 127 813,14 PLN (10 793 978,74 PLN from the EU).
Objective: to enhance the accessibility of Jagiellonian University for individuals with permanent or temporary disabilities, limited mobility due to age, or health conditions resulting from illnesses or accidents.
Beneficiaries: approximately 440 staff members.
Key Activities/Outcomes:

- training sessions for staff on university accessibility for people with disabilities, as well as training for students on stress management, note-taking, and maintaining life balance,
- adapting the building of the Jagiellonian University Teaching Support Center to meet the needs of individuals with disabilities,
- establishment of a council for responsible support and sustainable development,
- updating university websites and e-learning courses to comply with WCAG 2.1 accessibility standards,
- creation of an educational portal for people with disabilities,
- development of a navigation and information application and website for individuals with disabilities,
- creation of an application and website with sign language translation for lectures,
- implementation of a remote examination system for individuals with significant disabilities,
- purchase of evacuation chairs for people with disabilities.

Project name: Excellent University – Integrated Development Program of Jagiellonian University.
Source: Operational Program Knowledge Education Development (POWER).
Duration: 01.04.2019-31.12.2023.
Budget: 18 951 003,28 PLN (15 971 905,56 PLN from the EU).
Objective: to improve the quality of education, operations, and management at Jagiellonian University through the implementation of the Integrated University Development Program. The program focuses on adapting undergraduate and graduate study programs, enhancing the professional and language competencies of students and staff, supporting IT tools for university and teaching process management, creating open knowledge resources, and improving information management to enhance the quality of education at the university.
Beneficiaries: 1,878 individuals (1,278 students and 600 staff members).

Key Activities/Outcomes:

- adapting undergraduate and graduate study programs,
- enhancing professional and language competencies among students and staff,
- implementing IT tools for university and teaching process management numbering.

4.3. Warsaw University of Technology (WUT)

As part of the strategic project "Science - Education - Development - Cooperation," Warsaw University of Technology (WUT) implemented two projects that overlapped in terms of duration and scope of tasks: NERW PW and NERW 2 PW. The goal of both projects was to improve the functioning of Warsaw University of Technology in education and management, as well as to adapt the university's educational offerings to labor market needs by implementing a comprehensive program of actions focused on student-centered education.
Project name: Science - Education - Development - Cooperation PW.
Source: Operational Program Knowledge Education Development (POWER).
Duration: 01.02.2018-31.10.2022.
Budget: 37 985 430,39 PLN (32 014 120,73 PLN from the EU).
Beneficiaries: academic teachers, administrative and managerial staff, students.
Key Activities/Outcomes: 55 tasks within 4 action modules, including:

- establishment of 12 videoconferencing rooms to enhance educational activities,
- launch of new or modification of existing educational programs,
- student participation in training, courses, and workshops to improve professional, language, communication, entrepreneurial, and analytical skills,
- enhancement of academic teachers' teaching competencies and managerial and administrative staff's management skills through training and teaching internships,
- development of the SEZAM system and expansion of open educational resources (including the Industry 4.0 Platform).

Project name: Science - Education - Development - Cooperation 2 PW.
Source: Operational Program Knowledge Education Development (POWER).
Duration: 03.03.2019-31.12.2023.
Budget: 35 604 550,08 PLN (z 30 007 514,81PLN from the EU).
Beneficiaries: 2,767 individuals (exceeding the planned 2,053), including 331 staff members, 2,251 students, and 187 doctoral candidates.

Key Activities/Outcomes:
39 tasks within 6 modules, including:

- launch of new or modification of existing educational programs,
- improvement of students' competencies in professional, language, communication, entrepreneurial, and analytical skills through participation in training sessions, study visits, and PBL (Problem-Based Learning) activities,
- participation in internships by 210 students,
- conducting social research related to the quality of education and alignment of educational offerings with current needs,
- establishment of a Doctoral School,
- enhancement of academic teachers' teaching competencies and managerial and administrative staff's management, modern teaching, language, and IT skills through participation in training sessions, postgraduate studies, and study-training visits,
- development and integration of existing systems with newly implemented ones, such as USOS (University Study-Oriented System), Eduroam, and the Electronic Document Workflow system.

Project name: OMNIS – Openness. Modernisation. Innovation. Integration. Community/
Source: Operational Program Knowledge Education Development (POWER), Action 1.5/
Duration: 01.01.2024-28.02.2029/
Budget: 14 075 881,02 PLN (11 615 417,02 PLN from the EU)/
Objective: to adapt the educational offerings of Warsaw University of Technology to labor market needs in key industries such as renewable energy, aerospace, agriculture and food production, and transportation, while enhancing the competitiveness of the university's graduates/
Beneficiaries: students and academic teachers/
Key Activities/Outcomes:

- modifications of educational programs in collaboration with practitioners and entities from the socio-economic environment,
- participation of students in additional educational components such as training sessions or courses, study visits, extra classes conducted by industry specialists, or remedial classes,
- initiatives aimed at reducing the phenomenon of early school leaving,
- enhancement of teaching staff's competencies in digital skills, awareness and skills for green transformation, universal design, and modern teaching methods through participation in training sessions, courses, study visits, internships, and other forms of support.

Project Name: OMNIS2 – Openness. Modernisation. Innovation. Integration. Community.
Source: European Funds for Social Development 2021-2027 (FERS).
Duration: 01.05.2024 – 30.06.2029.
Budget: 17 362 058,12 zł (14 327 170,36 zł z UE).
Objective: to adapt the educational offerings of Warsaw University of Technology to labor market needs by implementing a comprehensive program of actions aimed at delivering modern, student-centered education that also addresses the requirements of the socio-economic environment.
Beneficiaries: 956 individuals, including students and academic teachers.
Key Activities/Outcomes:

- modification of educational programs in collaboration with practitioners and entities from the socio-economic environment,
- additional educational components such as training sessions/courses, extra classes conducted by industry specialists, and study visits for students,
- initiatives to reduce the phenomenon of early dropout, including remedial classes for students and efforts to recruit informed candidates,
- enhancement of teaching staff's competencies in areas such as digital skills, awareness, and skills for green transformation, as well as teaching competencies, including the use of modern teaching methods and methodologies. These improvements are facilitated through training sessions, courses, study visits, and teaching internships.

Over the past five years, the University of Warsaw, Jagiellonian University, and Warsaw University of Technology have implemented numerous projects funded by the European Union. These projects aimed to enhance the quality of teaching by developing new technologies, implementing new procedures, adapting infrastructure, and enriching academic and administrative staff competencies.

The execution of EU co-funded projects has facilitated the adaptation of study programs to labour market needs, the introduction of innovative teaching methods, and the development of digital tools to improve the educational process. Thanks to these initiatives, which have also helped ease the financial burden on their own budgets, these universities have consistently maintained top positions in academic rankings.

5. Summary

Revolution 5.0 highlights the necessity of integrating humans and technology across personal life, professional environments, and the educational process. Once again, universities must embrace flexibility, innovation, and adaptation to new challenges. Transformations associated with 5.0 not only advocate the use of advanced technologies, such as artificial

intelligence, but also emphasise the humanistic dimension of education, underlining the importance of developing social competencies.

EU programs, such as the previously implemented POWER (Operational Program Knowledge, Education, Development) and the current FERS (European Funds for Social Development), along with their associated initiatives, can serve as crucial support tools for universities in adapting to the demands of 5.0. These programs, rooted in EU policies like fostering a knowledge-based economy, enable universities to invest in infrastructure, new technologies, staff development, and the enhancement of educational programs.

As a result, universities are better positioned to respond effectively to the challenges posed by dynamic social and technological changes, while minimising the use of their own resources. The cases of three leading universities have exemplified this.

University budgets are often insufficient to meet the demands of technological revolutions. EU funds enable the implementation of additional initiatives that enhance educational programs and modernisation projects that would otherwise be financially out of reach for universities. This allows institutions to focus their financial resources on fulfilling their educational, research, and social missions or to diversify their portfolios to significantly reduce the burden on their own funds.

References

1. Al-Jaroodi, J., Mohamed, N., Abukhousa, E. (2020). Health 4.0: On the Way to Realizing the Healthcare of the Future. *IEEE Access*, *Vol. 8*, pp. 211189-211210, doi: 0.1109/ACCESS.2020.3038858
2. Andres, B., Sempere, F., Esteso, A., Alemany, M.M.E. (4-6.07.2022). Mapping between Industry 5.0 and Education 5.0. *EDULEARN22 Proceedings*, pp. 2922, doi: 10.21125/edulearn.2022.0739
3. Bagaria, N., Laamarti, F., Badawi, H.F., Albraikan, A., Martinez Velazquez, R., El Saddik, A. (2020). Health 4.0: Digital Twins for Health and Well-Being. In: A. El Saddik, M. Hossain, B. Kantarci (Eds.), *Connected Health in Smart Cities* (p. 144). Cham: Springer.
4. Chmielecki, P. (2021). Czy dzisiejszy uniwersytet hoduje troglodytów? Etyczne implikacje przemian szkolnictwa wyższego. *Edukacja Ustawiczna Dorosłych*, *No. 1(112),* p. 26, doi: 10.34866/446e-q263
5. Czaban, M., Janiak-Jasińska, A., Jaworska, B., Rosińska, A., Sas, M., Sempruch, G. *Kalejdoskop Programu ZiP*. Retrieved from: https://zip.uw.edu.pl/sites/default/files/content/kalejdoskop-programu-zip_publikacja-2024.pdf
6. *Doskonałość dydaktyczna uczelni*. Retrieved from: https://www.uw.edu.pl/doskonalosc-dydaktyczna-uczelni/?utm_source=chatgpt.com, 31.10.2024.

7. *European Council, Strategic Agenda 2024-2029*. Retrieved from: https://www.consilium.europa.eu/media/yxrc05pz/sn02167en24_web.pdf, 31.10.2024.
8. Ferreira, C., Serpa, S. (2018). Society 5.0 and Social Development: Contributions to a Discussion. *Management and Organisational Studies, Vol. 5, No. 4*, pp. 26, doi:10.5430/mos.v5n4p26.
9. Forcael, E., Ferrari, I., Opazo-Vega, A., Pulido-Arcas, J.A. (2020). Construction 4.0: A Literature Review. *Sustainability, Vol. 12(22), 9755,* pp. 4-7, doi:10.3390/su12229755.
10. Grądzki, W. (2021). Portal edukacyjny szansą rozwoju zdalnej edukacji Grądzki. In: A. Lukasek, A. Fidelus (Eds.), *Funkcjonowanie dziecka we współczesnym świecie. Współpraca z rodziną. Wyzwania, zagrożenia, perspektywy* (p. 139). Józefów: Wydawnictwo Wyższej Szkoły Gospodarki Euroregionalnej im. Alcide De Gasperi w Józefowie.
11. Heijden, J. (2023). Construction 4.0 in a narrow and broad sense: A systematic and comprehensive literature review. *Building and Environment, Vol. 244*. Retrieved from: https://doi.org/10.1016/j.buildenv.2023.110788.
12. Juszczyk, J. (2023).Funkcjonowanie młodzieży w świecie postcyfrowym na podstawie wielodyscyplinowych badań w ramach paradygmatów: Przemysł 4.0, Edukacja 4.0 oraz Społeczeństwo 5.0. In: E. Widawska (Ed.), *Młode pokolenie w (nie)przyjaznym świecie - konteksty teoretyczne, metodologiczne i praktyczne* (pp. 159-162). Kraków: ATW.
13. Kalaichelvan, R., Subramanin, P. (2023). Historical perspective of education 1.0 to education 5.0. In: S. Prakash, M.A. Muniammal, M.Maruthavanan, S. Raja Kumar, K. Thangavel, N. Sundar (Eds.), *Education 5.0: Revolutionizing Learning for the Future* (pp. 52-55). Madurai: Internal Quality Assurance Cell (IQAC).
14. *Key to the future - Kompleksowy program rozwoju kształcenia na potrzeby branż kluczowych UJ*. Retrieved from: https://key.zintegruj.uj.edu.pl/, 31.10.2024.
15. Mathur, A., Dabas, A., Sharma, N. (2022). *Evolution From Industry 1.0 to Industry 5.0*. 4th International Conference on Advances in Computing, Communication Control and Networking (ICAC3N), Greater Noida, India.
16. Mazurek, G. (2019). Transformacja cyfrowa - perspektywa instytucji szkolnictwa wyższego. In: J. Woźnicki (Ed.), *Transformacja Akademickiego Szkolnictwa Wyższego w Polsce w okresie 30-lecia 1989-2019* (pp. 16, 328). Warszawa: KRASP.
17. Mukul, E., Büyüközkan, G. (2023). Digital transformation in education: A systematic review of education 4.0. *Technological Forecasting and Social Change, Vol. 194, 122664*, Retrieved from: https://doi.org/10.1016/j.techfore.2023.122664.
18. Nagy, O., Papp, I., Szabó, R.Z. (2021). Construction 4.0 Organisational Level Challenges and Solutions. *Sustainability, Vol. 13(21), 12321*, p. 1, doi:10.3390/su132112321.
19. *NERW PW*. Retrieved from: https://www.nerw.pw.edu.pl/O-projektach, 31.10.2024.
20. *Odpowiedzialne wsparcie i zrównoważony rozwój Uniwersytet Jagielloński*. Retrieved from: https://przelamuj.uj.edu.pl/pl, 31.10.2024.

21. *OMNIS – Strona główna projektu.* Retrieved from: https://cpr.pw.edu.pl/projekty-realizowane/omnis-aktualnosci/, 31.10.2024.
22. *OMNIS2 – Informacje o projekcie.* Retrieved from: https://cpr.pw.edu.pl/projekty-realizowane/omnis2-aktualnosci/omnis2-informacje-o-projekcie/, 31.10.2024.
23. Organizacja Narodów Zjednoczonych. Rezolucja przyjęta przez Zgromadzenie Ogólne w dniu 25 września 2015 r., Przekształcamy nasz świat: Agenda na rzecz zrównoważonego rozwoju 2030.
24. Pilevari, N., Yavari, D. (2020). Industry Revolutions Development from Industry 1.0 to Industry 5.0 in Manufacturing. *Journal of Industrial Strategic Management, Vol. 5, Iss. 2*, pp. 44-51.
25. *Projekt Doskonały Uniwersytet – kształcenie dla gospodarki, realizowany w latach 2024-2029*. Retrieved from: https://doskonaly.uj.edu.pl/o-projekcie, 31.10.2024.
26. *Ranking Uczelni Akademickich 2024*. Retrieved from: https://2024.ranking.perspektywy.pl/ranking/ranking-uczelni-akademickich, 31.10.2024.
27. Raschke, S.U. (2022). Limb Prostheses: Industry 1.0 to 4.0: Perspectives on Technological Advances in Prosthetic Care. *Front. Rehabil Sci., Vol. 3*, p. 2, doi: 10.3389/fresc.2022.854404.
28. Shahidi Hamedani, S., Aslam, S., Mundher Oraibi, B.A., Wah, Y.B., Shahidi Hamedani, S. (2024). Transitioning towards Tomorrow's Workforce: Education 5.0 in the Landscape of Society 5.0: A Systematic Literature Review. *Education Sciences, Vol. 14, Iss. 10*, p. 2. Retrieved from: https://doi.org/10.3390/educsci14101041.
29. *Teaching Engagement Development (TED): Nauczyciele akademiccy i doktoranci wobec wyzwań przyszłości*. Retrieved from: https://ted.zintegruj.uj.edu.pl/, 31.10.2024.
30. Turečková, K., Nevima, J., Vaňová, A., Vitálišová, K. (2023). Society 4.0: general economic implications. *Journal of European Economy, Vol. 22, No. 2(85),* p. 150. Retrieved from: https://doi.org/10.35774/jee2023.02.146.
31. Vall, M. (2019). Super inteligentne społeczeństwo skoncentrowane na ludziach, czyli o idei społeczeństwa 5.0 słów kilka. *Państwo i Społeczeństwo, Iss. 2,* pp. 14, 13-18, doi: 10.34697/2451-0858-pis-2019-2-001.
32. Yunindanova, M.B. (2022). Preparing for Indonesian Agricultural Transformation in The Society Era 5.0. *Agrosains: Jurnal Penelitian Agronomi, Vol. 24, No. 1*, pp. 32-36. Retrieved from: https://doi.org/10.20961/agsjpa.v24i1.59741.