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DATA-DRIVEN DIGITAL APPROACHES TO MONITOR AND FOSTER WELL-BEING AMONG EXCHANGE STUDENTS DURING DISRUPTIVE EVENTS

ЦИФРОВІ ПІДХОДИ, ЗАСНОВАНІ НА ДАНИХ, ДЛЯ МОНІТОРИНГУ ТА ПІДТРИМКИ ДОБРОБУТУ СТУДЕНТІВ, ЯКІ НАВЧАЮТЬСЯ ЗА ПРОГРАМАМИ АКАДЕМІЧНОЇ МОБІЛЬНОСТІ, ПІД ЧАС ДЕСТАБІЛІЗУЮЧИХ ПОДІЙ

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Abstract. In today's rapidly changing world, marked by collective crises, the digitalization of academic mobility management processes plays a crucial role in enhancing the effectiveness of educational programs. Disruptive events such as pandemics, conflicts, or economic shocks create challenges for organizing and coordinating international student exchanges, impacting academic success and learning continuity. This paper examines data-driven digital approaches to managing student mobility during periods of crisis. It explores integrated information systems, real-time data collection and analysis platforms, and tools for monitoring key indicators of student participation in exchange programs.

Drawing on examples from European and global academic mobility initiatives, the study analyzes innovative digital solutions — including learning analytics, mobile applications, and dashboards — that support optimized management, increase process transparency, and enable rapid responses to changing conditions. Special attention is given to ethical data use, privacy protection, and accessibility of technologies within educational contexts. These digital tools facilitate better coordination among universities, allow for data-informed decision-making, and improve communication channels between stakeholders, contributing to more resilient and adaptive mobility programs.

The implementation of digital management systems in academic mobility contributes to improving the quality of exchange organization, reducing risks associated with unpredictable circumstances, and strengthening support for students in fulfilling their academic plans. The findings suggest that embedding such digital infrastructures into institutional frameworks is essential for sustaining academic mobility during times of global instability. Recommendations are provided for universities to integrate analytical tools and digital platforms as part of a sustainable strategy for mobility programs amid global instability.

Анотація. У сучасному світі, що швидко змінюється і зазнає колективних криз, цифровізація процесів управління академічною мобільністю відіграє ключову роль у підвищенні ефективності освітніх програм. Руйнівні події, такі як пандемії, конфлікти або економічні потрясіння, створюють виклики для організації та координації міжнародних студентських обмінів, впливаючи на академічну успішність та безперервність навчання. У статті досліджуються цифрові, орієнтовані на дані підходи до управління мобільністю студентів у періоди криз. Розглядаються інтегровані інформаційні системи, платформи для збору та аналізу даних у режимі реального часу, а також інструменти для моніторингу ключових показників участі студентів у програмах обміну.

На основі прикладів європейських і світових ініціатив академічної мобільності аналізуються інноваційні цифрові рішення — включно з аналітикою навчальних даних, мобільними застосунками та інформаційними панелями (дашбордами) — які допомагають оптимізувати управління, підвищити прозорість процесів і оперативно реагувати на зміни ситуації. Особливу увагу приділено етичному використанню даних, захисту конфіденційності та доступності технологій у освітньому контексті. Ці цифрові інструменти сприяють



кращій координації між університетами, забезпечують прийняття рішень на основі даних і покращують канали комунікації між зацікавленими сторонами, що робить програми мобільності більш стійкими та адаптивними. Впровадження цифрових систем управління академічною мобільністю сприяє підвищенню якості організації обмінів, зменшенню ризиків, пов'язаних із непередбачуваними обставинами, та посиленню підтримки студентів у реалізації їхніх навчальних планів. Результати дослідження вказують, що інтеграція таких цифрових інфраструктур у рамки закладів освіти є необхідною для забезпечення сталості академічної мобільності в умовах глобальної нестабільності. Надано рекомендації для університетів щодо включення аналітичних інструментів і цифрових платформ як частини стратегії сталого розвитку програм мобільності.

Key words: Academic mobility, digital systems, risk reduction, educational strategy, sustainability, student support

Ключові слова: Академічна мобільність, цифрові системи, зниження ризиків, освітня стратегія, сталість, підтримка студентів

INTRODUCTION

In the context of global instability, accompanied by pandemics, military conflicts, climate and social upheavals, higher education is experiencing unprecedented transformational pressures. These challenges are particularly acute in the area of international academic mobility. Students studying abroad or participating in academic exchange programs face additional psychological, social and logistical challenges. In this context, digital, data-driven approaches (data-driven) are becoming critical. approaches), which allow not only to effectively manage mobility, but also to systematically support the well-being of education seekers in times of crisis.

The experience of recent years — the COVID-19 pandemic, the full-scale invasion of Ukraine by the Russian, mass internal displacements, and disruption of educational infrastructure — has clearly demonstrated the need for fundamental changes in the organization of international activities of universities and in the formation of a system for monitoring student well-being.

Theoretical part

Since the beginning of the COVID-19 pandemic, more than 1.5 billion students around the world have been forced to adapt to online education. According to UNESCO, more than 190 countries have implemented the closure of educational institutions. This has led to the rapid implementation of digital solutions in the field of education. Ukraine is no exception. In particular, the Odesa National University of Technology (ONUT) quickly created digital modules to support students in international mobility [1].

This experience became a catalyst for a digital transformation that included:

- implementation of distance learning platforms (Google Classroom, Moodle, Zoom);
- creating digital student profiles;
- launching internal portals for analytics, surveys, and support.

International academic mobility has traditionally been seen as a key tool for the internationalization of higher education. However, in times of instability, it becomes a risk area. Students abroad may face:

- legal barriers (loss of status, lack of visa);
- psychological challenges (loneliness, anxiety);
- financial difficulties (violation of scholarship payments or changes in currency exchange rates);
- cultural barriers (culture shock, language barrier).

A significant number of Ukrainian students who ended up in the EU after the outbreak of full-scale war were forced to adapt to new universities, languages, and assessment systems. The universities that accepted such students often lacked appropriate digital mechanisms for systematic monitoring and support of their adaptation [2].

Research conducted by the EU on the topic of " Student Well-Being: The role of socio-demographic background, contextual conditions, and study demands and resources on the well-being of students in the European Higher Education Area » [5] systematized information on approaches to supporting the psycho-emotional state of students.

As noted in [5], even before the start of the COVID-19 pandemic, the mental health of young students attracted the attention of researchers and specialists, who repeatedly characterized the situation as a crisis. With the onset of the pandemic, this problem has become even more widespread. In the countries of the European Higher Education Area, a significant deterioration in the emotional state and general well-being of students was recorded, which became a serious challenge for educational policy and management in the field of higher education. It turned out that quarantine restrictions, in particular distance learning, lockdowns and the need to observe social isolation, significantly affected the psychological comfort of students. The lack of social interaction with classmates, a decrease in involvement in the educational process and a drop in motivation were especially noticeable. Even during the period of resumption of full-time education, when some higher education institutions returned to traditional formats or chose blended models, a number of problems have not lost their relevance. Many students continue to face personal challenges and symptoms of emotional burnout.

The WHO-5 Well -Being Scale is widely used to monitor the psycho-emotional state of students [7], developed by the World Health Organization in 1998. This instrument has proven to be a reliable and effective means of identifying the level of psychological well-being, particularly in the context of changes associated with the pandemic.

Focusing exclusively on academic workload and resources neglects the important role of students' socio-demographic context and the related inequalities in access to educational opportunities and a comfortable learning environment. In [5], an expanded vision of the model of the relationship between educational demands and resources (SD-R model), as presented in 2020, is proposed, which is presented in Figure 1. An important element of this model is the consideration



of the individual socio-demographic profile of the student - age, gender, disability, migration background, parental education level. These factors shape individual contextual conditions of learning - both academic and personal. Within the updated conceptual framework, they are considered as prerequisites for influencing educational demands and resources, as proposed in the original SD-R model.

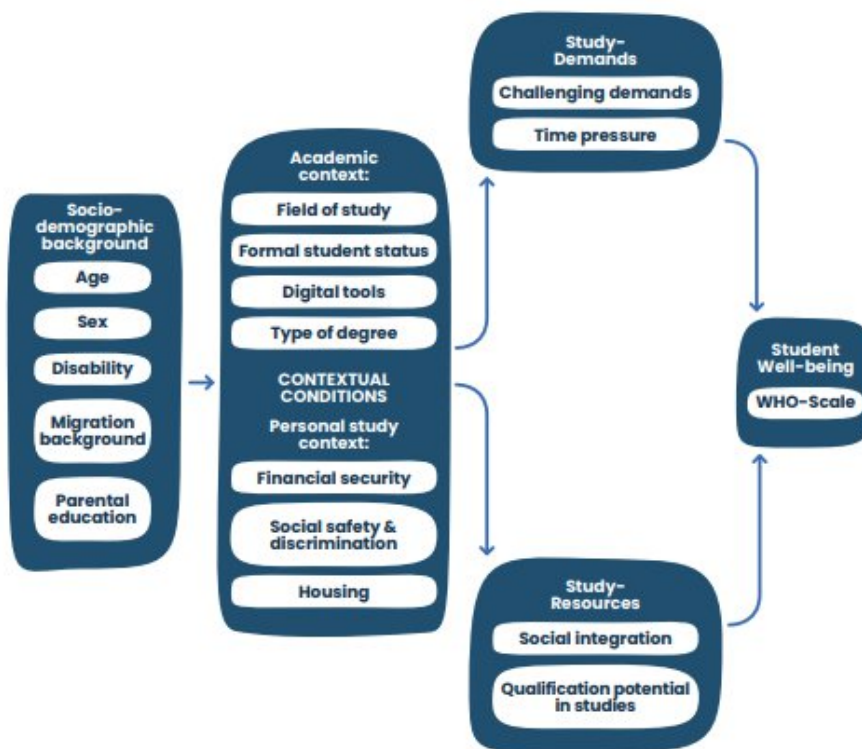


Fig. 1 Adapted SD-R model of the author [5]

Adaptation of the model presented in Figure 1 will allow for a better organization of the educational process of students, especially within the framework of academic mobility. Summarizing this case, it can be noted that modern approaches to ensuring student well-being (student well-being) involve the integration of several dimensions:

- emotional – psychological stability, anxiety level, support;
- academic – access to educational resources, learning outcomes;
- social – participation in student initiatives, social integration;
- digital – access to platforms, interface usability, digital literacy.

As noted above, COVID-19 has raised the issue not only of the psycho-emotional well-being of education seekers, but also of rapid adaptation and flexibility to the digitalization of all processes.

Practical part

It is digital data management approaches that allow all these aspects to be assessed and monitored in real time.

Education Management Information System (EMIS) [8] serve as the basis for the digital transformation of international mobility. They include:

- mobility registration portals (e.g. Erasmus + Dashboard);
- integrated CRM for interaction with students;
- analytics collection systems (Academic Analytics Dashboards);
- chatbots and intelligent assistants to support students;
- integration with eHealth , eGovernment and other government registries.

With the adoption of the Sustainable Development Goals (SDGs), the UNESCO Institute for Statistics (UIS) was recognized as the “official source of cross-nationally comparable data on education”, as confirmed in the Education 2030 Framework for Action. UIS was given the mandate to “collaborate with partners to develop new indicators, statistical approaches and monitoring tools to better assess progress towards the goals related to UNESCO’s mandate, working in coordination with the Education 2030 Steering Committee” [8].

IMS can be defined as “a system for collecting, integrating, processing, maintaining and disseminating data and information to support decision-making, policy analysis and formulation, planning, monitoring and management at all levels of the education system. It is a system of people, technologies, models, methods, processes, procedures, rules and regulations that function together to provide education leaders, decision-makers and managers at all levels with a comprehensive, integrated set of relevant, reliable, unambiguous and timely data and information to support them in carrying out their responsibilities” [9].



In the era of big data, organizations are collecting and processing ever-increasing amounts of data, including through benchmarking approaches. When we talk about a data-driven organization, it means that strategic decisions are based on the analysis and interpretation of data. This brings more value and improves the competitive advantage of organizations. The Data-driven Concept is to base decision-making on concrete and analyzed information. And this has many benefits for all organizations, regardless of their sector of activity

Using data and proper analysis in the decision-making process contributes to better outcomes. And this is for several reasons:

- Data Insight: Data-driven organizations improve their knowledge and their goals.
- Predictive analytics: In addition to detailed data insights, data-driven management allows for the prediction of different hypotheses. Depending on possible scenarios, organizations can make the best decision to achieve the desired outcome.
- Risk reduction: through predictive analysis based on reliable data.

The introduction of the education-science-business model into the educational process allows for the implementation of best business practices in educational and research processes, which increases the efficiency of the educational institution. Data-driven The approaches have proven their effectiveness in commercial institutions, and their application in the educational sphere to support students will allow increasing the number of participants in international academic mobility and applying effective caseim psychological support.

A data-driven approach allows you to move from reactive response to strategic planning of student support. This includes:

- creating risk indicators (e.g., frequency of visits to online platforms, level of communication with coordinators, survey responses);
- personalized adaptation routes for students;
- integration of early warning algorithms (early-warning systems) regarding academic or psychological crisis;
- decision-making tools for international program coordinators.

Supporting students' emotional well-being is a key challenge. Digital technologies offer new opportunities here:

- AI chatbots for psychological self-diagnosis;
- anonymous support platforms;
- integration with online psychologists through internal portals;
- emotional state screenings through weekly surveys;
- digital maps of support services.

In response to the unprecedented challenges posed by the full-scale russian invasion of Ukraine, Odesa National University of Technology (ONUT) implemented a number of **data-driven solutions** aimed at **psychological support for students** and **effective management of academic mobility** . At the heart of these solutions is the use of digital data to make informed, context-sensitive management decisions.

After February 24, 2022, thousands of students found themselves in a situation of forced displacement, loss of a stable learning environment, severed educational ties, and psychological trauma. Academic mobility, traditionally a tool for development, has acquired a new meaning — as a means of **maintaining access to education** , **integration into new educational systems** and **overcoming the traumatic consequences of war** .

Using online surveys, tracking mobility applications, and monitoring referrals to psychologists, the university created a multidimensional database on the regional distribution of displaced students; requests for academic or psychological support; academic performance and engagement and degree of integration into new educational communities abroad. This data became the basis for adapting educational itineraries, individual recommendations, and psychosocial support.

Partner universities from the EU, in particular within the Academies4Ukraine platform, have launched initiatives to provide Ukrainian students with online psychotherapy, access to crisis lines and support groups [3].

- eID integration ;
- data exchange between universities through Erasmus Without Paper (EWP);
- use of European Student Card ;
- creating a single digital educational ecosystem by 2030 [4].

It is important for Ukrainian universities, as part of the European Educational Space, to integrate into these processes now.

Digital tools have made it possible to track not only the logistics of academic movements, but also **the emotional state of education seekers** and their **need for psychological help.** or **readaptation after return** .

Conclusion

Ensuring the well-being of students in international mobility in times of crisis is a challenge that requires a comprehensive response. Data-driven digital tools empower universities not only to coordinate mobility but also to support each student at all stages of their academic journey.

ONTU, as an active participant in the international educational ecosystem, continues to develop tools for digital monitoring, support, and communication with mobile learners.

ONTU's experience demonstrates that **data-driven approaches in times of crisis** are not only a management tool, but also **a form of ethical responsibility** to students. The integration of educational, psychological, and mobilization data into a single decision-making system allows not only to preserve the educational process, but also to restore human potential through support, flexibility, and scientifically based assistance.

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