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THE RELATIONSHIP BETWEEN THE REORGANIZATION OF HIGHER EDUCATION INSTITUTIONS' OPERATIONS IN POLAND DURING THE COVID-19 PANDEMIC AND STUDENT LOYALTY

ZWIĄZEK MIĘDZY REORGANIZACJĄ FUNKCJONOWANIA SZKÓŁ WYŻSZYCH W POLSCE W CZASIE PANDEMII COVID-19 A LOJALNOŚCIĄ STUDENTÓW

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ABSTRACT

The aim of the study was to determine the nature of the relationship between the reorganization of higher education institutions in Poland, including the quality of online class delivery during the COVID-19 pandemic, and student loyalty - using the Net Promoter Score (NPS). Given the sudden transition to online learning, HEIs faced challenges in delivering educational continuity, with varying degrees of success across institutions. The study was conducted on a sample of 2,832 Polish students. Using exploratory factor analysis (EFA), the main components were identified for various variables pertaining to the functioning, organization, and delivery of online classes, as well as for aspects associated with university operations during the COVID-19 pandemic. In terms of administrative and organizational support, as well as technical and didactic assistance during the pandemic, universities were rated relatively highly. However, respondents held a slightly less favorable view of the atmosphere and practical value of online classes. The lowest ratings were given to the offerings for professional and academic development. Our findings also indicate a higher satisfaction among female and part-time students, and a positive correlation between administrative efficiency and student loyalty. The analysis also reveals that first-year students and graduate-level participants displayed higher loyalty, while loyalty tended to decrease with the length of study. In the area of student loyalty, the analysis of NPS indicates that first-year undergraduate students and graduate students exhibit a higher level of loyalty – the NPS values were positive, although overall relatively low. Regarding the factors influencing loyalty, the strongest correlations with student loyalty were observed in the case of the administrative and organizational efficiency of the university and the technical and didactic support in remote education – higher correlation values were recorded for female students and part-time students. These findings highlight critical areas for HEIs to address in enhancing stu-dent satisfaction and loyalty in a rapidly changing educational environment.

Key words: higher education institutions' (HEIs), online learning, COVID-19 pandemic, Net Promoter Score (NPS), online education barriers, students' loyalty.

ABSTRAKT

Celem badania było określenie charakteru związku między reorganizacją szkół wyższych w Polsce, w tym jakością prowadzenia zajęć online w czasie pandemii COVID-19 a lojalnością studentów – z wykorzystaniem Net Promoter Score (NPS). W związku z nagłym przejściem na prowadzenie zajęć online szkoły wyższe stanęły przed wyzwaniami związanymi z zapewnieniem ciągłości edukacyjnej, z różnym poziomem sukcesu edukacyjnego w poszczególnych instytucjach. Badanie przeprowadzono na próbie 2832 polskich studentów. Wykorzystując metodę głównych składowych, wyszczególniono główne składowe elementów związanych z funkcjonowaniem, organizacją i prowadzeniem zajęć online, a także główne składowe związane z funkcjonowaniem uczelni w czasie pandemii COVID-19. W zakresie wsparcia administracyjnego i organizacyjnego, jak również techniczno-dydaktycznego w czasie pandemii COVID-19, uczelnie zostały ocenione relatywnie wysoko. Niecno gorsze zdanie badani mieli w przypadku atmosfery i praktycznej wartości zajęć online, a najgorsze wyniki uzyskała oferta rozwoju zawodowego i naukowego. W obszarze poziomu lojalności studentów wobec uczelni analizy NPS wskazują, że studenci pierwszych lat studiów pierwszego stopnia oraz studiów drugiego stopnia cechują się wyższym poziomem lojalności – wartości NPS były dodatnie, jednak ogólnie na relatywnie niskim poziomie. W grupie czynników wpływających na poziom lojalności najsilniejsze korelacje z lojalnością studentów zaobserwowano w przypadku efektywności administracyjnej i organizacyjnej uczelni oraz wsparcia techniczno-dydaktycznego w edukacji zdalnej. Przy czym wyższe wartości korelacji odnotowano dla kobiet i studentów niestacjonarnych.

Słowa kluczowe: instytucje szkolnictwa wyższego (HEI), nauka online, pandemia COVID-19, wskaźnik promotorów netto (NPS), bariery w edukacji online, lojalność studentów.

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1. Introduction

The COVID-19 pandemic caused widespread disruption across the globe and compelled organizations to rapidly alter their operational methods. Higher education institutions (HEIs) worldwide confronted the challenge of maintaining educational continuity during the pandemic, which highlighted their shortcomings in adequately planning for a potential crisis, resulting in several negative impacts on both research and teaching activities (Shamsir et al., 2022). The responses of HEIs were very diverse, including measures such as space management, sanitation protocols, and, in more severe cases, lockdowns. However, the most prevalent solution was the shift to online classes (Furiv et al., 2021; Oleksiyenko et al., 2021). Some universities adapted swiftly to the new operational landscape, as exemplified by their rapid transition to online learning (Cordova et al., 2021).

The COVID-19 pandemic forced universities to embrace innovation and digitization, accelerating a rapid adaptation process that, while challenging, brought a range of tangible benefits to teaching and learning processes (Chukwuere, 2024). The shift to online

education also posed significant organizational challenges, requiring adaptation from teachers, students, and administrative staff alike. The way classes were taught during the COVID-19 pandemic at HEIs worldwide later influenced students' perceptions of those institutions. Some managed this situation more effectively than others.

The aim of this article is to explore the potential relationship between HEIs' transition to online operations (including remote administration and remote classes) and student loyalty, as measured by the Net Promoter Score (NPS). The NPS is a well-established methodology that aids in assessing HEIs' organizational performance and enhancing the quality of their offerings (Cruz et al., 2019). It has been effectively used, for example, in studies such as German and Lestari's (2021) evaluation of teachers and students' feedback on the Cambridge Learning Management System.

2. Literature review

The key determinants of service quality in higher education include the quality of academic services, facilities, lecturers, and programs (Kwarteng & Mensah, 2018). Bouranta et al. (2024) identified access, academic aspects, online learning, and program-related issues as critical factors influencing student satisfaction in Greek higher education. Guzmán Rincón et al. (2024) found that satisfaction with different elements of online higher education at HEIs in Colombia had a varying impact on overall satisfaction with the institution and dropout intentions. Such findings highlight the critical role of administrative and support services in shaping student satisfaction, suggesting that satisfaction with organizational aspects serves as a key indicator of students' overall perception of the institution.

The COVID-19 pandemic led to a significant reduction in face-to-face interactions for a period, often limiting all interactions to conversations via webcams. Traditional study programs and courses, initially designed for in-person instruction, had to be adapted for online delivery. This abrupt shift presented significant challenges for academic staff, who needed to adapt the content and structure of their courses to a virtual environment. Given that the quality of academic staff and study programs are key elements in generating value for students (Lapina et al., 2016), these adaptations were crucial. Unfortunately, the transition to online education was not always successful for HEIs, as this process encountered numerous barriers, which were observed to varying degrees worldwide. Challenges in adopting this solution affected not only students but also HEIs' academic staff and administrative personnel.

Cramarenco et al. (2023) and Zamora-Antuñano et al. (2022) highlight several obstacles that impeded this transition, such as inadequate equipment for both students and teachers,

limited digital literacy, unstable internet access, increased demands for support services, student attitudes, and student attendance at class sessions. Revising courses, lectures, seminars, laboratory sessions, and assessments to integrate digital and mobile technologies often required additional work from faculty members (Cramarenco et al., 2023; Camilleri et al., 2021; Zizka & Probst, 2022). Conrad et al. (2022) further noted that factors such as information overload and the perceived technical skills required for online platforms adversely impacted satisfaction with the virtual learning environment, and that certain design elements – such as class structure and teaching quality – negatively influenced student experiences. Similarly, Turnbull et al. (2021) identified key barriers in the shift to online education, including issues with integrating synchronous and asynchronous tools, access to necessary technology, faculty and student digital competency, concerns over academic integrity, and privacy. Gonzalez-Ramirez et al. (2021) also noted challenges including connectivity and financial constraints, along with negative effects on social interactions, motivation, and health-related behaviors associated with this learning mode.

Research findings illustrate that, across various countries, the shift to online learning was not universally accepted or welcomed. Iqbal et al. (2022) found that Pakistani students were largely dissatisfied with online education during the COVID-19 pandemic, citing insufficient institutional support and low-quality online instruction. They also expressed little interest in continuing online learning once pandemic restrictions were lifted. Similar sentiments were observed among Indonesian students, who generally held negative views of their online learning experiences during the pandemic (Maydiantoro et al., 2020). In South Africa, research conducted at higher education institutions revealed a preference among students for face-to-face learning over online formats, which were hindered by various issues, such as limited data availability, unstable network connections, unconducive home environments, and feelings of isolation (Matarirano et al., 2021). Research in India by Kundu and Bej (2021) further suggests that students feared encountering significant challenges in the online learning environment and felt unprepared for virtual classes during the pandemic.

In certain instances, students initially viewed online learning as an innovative approach; however, over time, it often came to be perceived as monotonous. Zizka and Probst (2023) found that although students in Switzerland recognized the practical benefits of online education, their motivation gradually declined. Similarly, Alexa et al. (2022) reported that Romanian students initially exhibited high motivation in online classes, but this waned as this mode of instruction continued. Limited or absent interaction between the students and instructors in this study, as well as among the students themselves, further reduced motivation and adversely affected their mental health. Packmohr and Brink (2021) found that students expressed a stronger preference for blended learning formats over fully online

courses, noting that shifts in course delivery modes hindered their learning outcomes. Due to methodological differences, not all courses could be delivered at a comparable level online – in laboratory-based classes, for example, some competencies can only be effectively developed in person. This is corroborated by Behera et al. (2023), whose findings revealed a marked preference among engineering students for face-to-face instruction, particularly in laboratory settings.

The findings presented in the literature underscore the diverse perceptions and outcomes associated with the shift to online learning during the COVID-19 pandemic, with numerous studies indicating that this teaching approach was not universally effective. While many studies revealed significant challenges, others highlighted potential benefits and neutral outcomes. For example, a study conducted in Portugal found that students' perceptions of lecturer performance remained unchanged despite the transition from in-person to online education, with no significant differences between pre- and post-COVID-19 conditions (Alves dos Reis, 2021). Additionally, emergency remote education during the pandemic provided students with opportunities to gain new educational and learning experiences. Ukrainian students, for instance, primarily enhanced their digital literacy and communication skills (Mospan et al., 2022).

Interestingly, alongside computers and laptops, students also relied on smartphones to participate in online learning. Krishnan and Sharma (2021) identified smartphones as students' preferred devices for this purpose. Similarly, Biswas et al. (2020) reported that most student respondents in Bangladesh viewed mobile learning (m-learning) positively during the COVID-19 pandemic. Consistent with these findings, research among female students in the United States also indicated a favorable perception of m-learning throughout the pandemic (Saleh and Jalambo, 2022).

Given the marked differences in how online studies are evaluated by students across various countries, as illustrated in the above literature review, further research on HEI stakeholders' perceptions of online classes in additional contexts and countries is essential for understanding the factors that drive these differences. For instance, comparative research by K. Fuchs (2021) demonstrated striking contrasts between students in Thailand and Finland. While both groups agreed that complete courses could be delivered online, the Thai students – unlike their Finnish counterparts – did not perceive digital collaboration with their peers as beneficial. Similarly, Cranfield et al. (2021) found significant cross-country differences in students' views on emergency online learning during the COVID-19 pandemic.

In Poland, after the COVID-19 outbreak was declared, the government announced the suspension of educational institutions' activities starting on March 11, 2020 (NIK, 2021). Initially, and even later in the pandemic, no explicit guidelines were provided on how HEIs

should operate, including how to conduct classes. As such, HEIs in Poland were granted considerable autonomy in deciding on operational formats. As the pandemic evolved, so did educational approaches, with some universities opting to conduct classes entirely online, while others adopted a hybrid model. Every university that continued its educational activities throughout the pandemic utilized online instruction for at least some period, enabling comparative studies on the satisfaction of HEI stakeholders in Poland with this mode of learning.

Research among first-year undergraduate students in Poland revealed a preference for distance learning over traditional in-person instruction, with enjoyment of the online format and a sense of self-efficacy being the primary factors contributing to that preference (Cicha et al., 2021). However, challenges associated with the abrupt transition were significant. A study conducted among Polish undergraduates suggests that the lack of information and dysfunctional communication that resulted in chaos were the most important ones (Kulikowski et al., 2021). Turbulent changes in the functioning of HEIs impacted perceptions of service quality, a critical determinant of student satisfaction, which, Borishade et al. (2021) have shown, can have a significant impact on student loyalty.

3. Research design

An empirical study was conducted to assess the readiness of Polish HEIs for the COVID-19 pandemic. The study employed the Computer-Assisted Web Interview (CAWI) technique, involving 2,832 students (N=2832) at six economic universities, the management faculties of two technical universities, and seven universities across Poland[1]. The proprietary research questionnaire covered several areas: the functioning of universities during the COVID-19 pandemic (17 variables), the organization and delivery of online classes during the COVID-19 pandemic (20 variables), the likelihood of students recommending their HEI to friends or acquaintances, as well as demographic data – such as gender, mode of study, type of degree program, and year of study.

The scope of the empirical study can be summed up as follows:

a) Subject – students from economic HEIs or departments with an economic profile at other HEIs.

[1] List of higher education institutions whose students participated in the empirical study: Kozminski University, Bialystok University of Technology, Warsaw University of Technology, Poznan University of Technology, Warsaw University of Life Sciences, SGH Warsaw School of Economics, University of Economics in Katowice, Cracow University of Economics, Poznan University of Economics and Business, Wroclaw University of Economics and Business, Jan Kochanowski University of Kielce, Maria Curie-Skłodowska University, University of Szczecin, University of Warsaw, University of Warmia and Mazury in Olsztyn and University of Zielona Góra.

b) Object – evaluation of crisis management at HEIs, focusing on aspects of the organization of higher education operations during the COVID-19 pandemic.
c) Spatial scope – Poland.
d) Temporal scope – the first half of 2021.

Table 1 presents the structure of the study population based on the following criteria: gender, mode of study, type of degree program, and year of study.

Table 1. Distribution of the study population.

Characteristics of Respondents		N	%↕
Gender	F	1892	66.8
	M	940	33.2
	Total	2832	100.0
Study Mode	Full-time	2053	72.5
	Part-time	779	27.5
	Total	2832	100.0
Type of Degree Program	Engineer	319	11.3
	Bachelor's	1645	58.1
	Master's / Int. Master's	888	30.6
	Total	2832	100.0
Year of Study	1st	946	33.4
	2nd	702	24.8
	3rd	482	17.0
	4th (or 1st Master's)	453	16.0
	5th (or 2nd Master's)	249	8.8
	Total	2832	100.0

Legend:
N – Number; %↕ – Percentage within a column; %↔ – Percentage within a row
F – Female; M – Male

The PS IMAGO Pro 10 (IBM SPSS Statistics 29) statistical package was utilized to analyze the collected data. A five-point Likert scale was employed to evaluate students' perceived preparedness of universities to conduct online classes during the COVID-19

pandemic, with values as follows: 1 – very poor preparation, 2 – rather poor preparation, 3 – average preparation, 4 – rather good preparation, and 5 – very good preparation. Assuming equal dis-tances between categories on the ordinal scale, mean values were calculated to rank aspects of university operations, as well as the organization and conduct of classes at the surveyed insti-tutions during the COVID-19 pandemic. Further methodological steps included exploratory factor analysis (EFA), analysis of variance (ANOVA), independent samples t-test, NPS and Spearman's rank correlation coefficient.

4. Results

The analysis covered two primary sets of variables: the first encompassed those related to the functioning of universities during the COVID-19 pandemic, while the second included variables related to the organization and delivery of online classes at universities during this period. A list of variables along with their mean values is presented in Table 2.

Table 2. Aspects of the functioning, organization and delivery of online classes at universities during the COVID-19 pandemic.

Aspects of the functioning of universities during the COVID-19 pandemic	Overall Mean	Aspects of the organization and delivery of online classes at universities during the COVID-19 pandemic	Overall Mean
F1. General impression/perception of the university	3.87	O1. Quality of online classes	3.86
F2. Career prospects post-graduation	3.67	O2. Satisfaction with online classes	3.71
F3. Reorganization of classes to online formats	3.92	O3. Atmosphere during online classes	3.89
F4. Access to library/reading rooms	3.42	O4. Practical usefulness of knowledge gained online	3.54
F5. Efficiency of student services by university administration (dean's offices, student services offices, etc.)	3.65	O5. Assimilation of knowledge during online classes	3.31
F6. Attitude of administrative staff towards students	3.67	O6. Functionality of the online class platform	4.00
F7. Digitalization of student services (e-campus, online services, student accounts, etc.)	3.81	O7. Technical support from the university	3.50
F8. Transparency of the study process (e.g., conditions for choosing specializations)	3.70	O8. Training/materials for handling the online class platform	3.68
F9. Organization of the recruitment process (for undergraduate and graduate programs)	3.90	O9. Instructors' ability to manage the online class platform	3.85

F10. Availability of infrastructure for students to conduct their own research (e.g., for thesis work)	3.40	O10. Efficiency/organization of conducting online classes by instructors	3.94
F11. Offers of internships/professional placements/student placements	3.17	O11. Method of knowledge transmission during online classes	3.76
F12. Job offers/assistance from the university in finding employment	3.01	O12. Criteria for passing online classes	3.94
F13. Offers of study abroad (Erasmus+, exchange programs with other universities, etc.)	3.52	O13. Materials for online classes	4.12
F14. Offers from student academic societies (SAS)	3.54	O14. Instructors' attitude towards students	4.04
F15. Offers of training, courses, webinars	3.66	O15. Clarity of instructions from instructors during online classes	3.95
F16. System for regulating tuition payments (rules, amounts, etc.)	3.72	O16. Responsiveness of instructors	4.01
F17. Scholarship system	3.47	O17. Interactions with instructors	3.90
		O18. Opportunity to participate in online consultations	4.17
		O19. Offers of open lectures	3.48
		O20. Participation of business practitioners in online classes	3.23

F – variable relating to the functioning of universities during the COVID-19 pandemic

O – variable relating to the organization and delivery of online classes at universities during the COVID-19 pandemic

The aspects rated highest by respondents were as follows:

a) reorganization of classes to an online format ($\bar{x}_3$ = 3.92), the organization of the recruitment process ($\bar{x}_9$ = 3.90) and the general impression/perception of the university ($\bar{x}_1$ = 3.87), among the variables related to the functioning of universities during the COVID-19 pandemic,
b) the opportunity to participate in online consultations ($\bar{x}_{19}$ = 4.17), materials for online classes ($\bar{x}_{13}$ = 4,12) and instructors' attitude towards students ($\bar{x}_{14}$ = 4.04), among the variables related to the organization and delivery of online classes at universities during the COVID-19 pandemic.

Due to the presence of multi-element sets of variables, Exploratory Factor Analysis (EFA) was employed to identify latent dependencies among the studied variables and reduce the number of original variables into newly defined components (Watkins, 2018;

Reio & Shuck, 2015; Taherdoost et al., 2014). To assess data quality in the context of EFA, the Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett's test of sphericity were used – the test values are presented in Tables 3 and 4. In the process of extracting components, the VARIMAX orthogonal rotation was used (Lloret et al., 2017; Goretzko et al., 2021). The results of EFA within the set of variables related to the functioning of universities during the COVID-19 pandemic allowed for the reduction of 17 variables to 2 components[2]. The first component includes variables associated with the administrative and organizational efficiency of the university, while the second encompasses variables relating to the offer of professional and academic development (Table 3).

Table 3. EFA results for variables relating to the functioning of universities during the COVID-19 pandemic.

Component	Overall Mean	Factor loading	Primary Variables
FC1. Administrative and organizational efficiency of the university	3.77	.701	1. General impression/perception of the university
		.677	3. Reorganization of classes to online formats
		.775	5. Efficiency of student services by university administration (dean's offices, student services offices, etc.)
		.755	6. Attitude of administrative staff towards students
		.777	7. Digitalization of student services (e-campus, online services, student accounts, etc.)
		.666	8. Transparency of the study process (e.g., conditions for choosing specializations)
FC2. Offer of professional and academic development	3.38	.783	11. Offers of internships/professional placements/student placements
		.797	12. Job offers/assistance from the university in finding employment
		.751	13. Offers of study abroad (Erasmus+, exchange programs with other universities, etc.)
		.789	14. Offers from student academic societies (SAS)
		.725	15. Offers of training, courses, webinars

FC – component relating to the functioning of universities during the COVID-19 pandemic
KMO = .939; Bartlett's test of sphericity = 27667.684

[2] The minimum value of factor loadings qualifying primary variables for components was set at .600.

Analysis of the mean values of the new components indicates a higher rating for variables relating to the administrative and organizational efficiency of the university ($\bar{x}$ = 3.77) than for those addressing the evaluation of the professional and academic development offer ($\bar{x}$ = 3.38).

EFA was subsequently applied to the variables relating to the organization and delivery of online classes at universities during the COVID-19 pandemic. This method allowed the original set of 20 variables to be reduced to 2 distinct components. The first encompasses factors related to technical and didactic support in remote education, while the second includes elements contributing to the atmosphere and practical value of online education (Table 4).

Table 4. EFA results for variables relating to the organization and delivery of online classes at universities during the COVID-19 pandemic.

Component	Overall Mean	Factor loading	Primary Variables
OC1. Technical and didactic support in remote education	3.84	.605	7. Technical support from the university
		.626	9. Instructors' ability to manage the online class platform
		.614	10. Efficiency/organization of conducting online classes by instructors
		.633	13. Materials for online classes
		.739	14. Instructors' attitude towards students
		.676	15. Clarity of instructions from instructors during online classes
		.759	16. Responsiveness of instructors
		.708	17. Interactions with instructors
		.747	18. Opportunity to participate in online consultations
		.672	19. Offers of open lectures
		.602	20. Participation of business practitioners in online classes
OC2. Atmosphere and practical value of online education	3.68	.770	1. Quality of online classes
		.843	2. Satisfaction with online classes
		.735	3. Atmosphere during online classes
		.800	4. Practical usefulness of knowledge gained online
		.842	5. Assimilation of knowledge during online classes
		.728	11. Method of knowledge transmission during online classes

OC – component relating to the organization and delivery of online classes at universities during the COVID-19 pandemic
KMO = .969; Bartlett's test of sphericity = 47758.662

A comparison of mean values for the identified components indicates a higher rating for technical and didactic support in remote education ($\bar{x}$ = 3.84) than for the atmosphere and practical value of online education ($\bar{x}$ = 3.68).

Next, the mean values of components identified through EFA were compared based on selected characteristics of the respondents (including included gender, study mode, type of degree program, and year of study) and the likelihood of recommending their HEI to others (in line with the according to the Net Promoter Score framework). A ten-point scale developed by F. Reichheld was used to calculate NPS (Vélez et al., 2020; Reichheld, 2003; Rocks, 2016; Reichheld & Schefter, 2000), where a score of '1' indicated a very low likelihood of recommendation and a score of '10' indicated almost certain recommendation. Responses were categorized into three groups: *detractors* (scores 1–6), *passively satisfied* (scores 7–8), and *promoters* (scores 9–10). The NPS indicator was then calculated by subtracting the percentage of detractors from the percentage of promoters (*NPS = P – D*). Positive NPS values indicate a higher prevalence of promoters over detractors, signifying favorable evaluations of universities' preparedness during the COVID-19 pandemic.

The independent samples t-test was applied when there were no more than two groups of respondents, whereas analysis of variance (ANOVA) was used for comparisons across three or more respondent groups (Armstrong et al., 2000; Ferreira et al., 2014). The comparison of university functioning components during the COVID-19 pandemic across selected respondent groups is presented in Table 5.

Table 5. Comparison of university functioning components during the COVID-19 pandemic between selected respondent groups.

Component	Overall Mean	Gender F | M	test-t
FC1. Administrative and organizational efficiency of the university	3.77	$3.83^{2} > 3.65^{1}$	5.241***
FC2. Offer of professional and academic development	3.38	$3.43^{2} > 3.29^{1}$	3.975***
Component	**Overall Mean**	**Study Mode FT | PT**	**test-t**
FC1. Administrative and organizational efficiency of the university	3.77	$3.73^{1} < 3.86^{2}$	-3.571***
FC2. Offer of professional and academic development	3.38	$3.36^{1} < 3.45^{2}$	-2.441**
Component	**Overall Mean**	**Type of Degree Program E | BA | MA**	**ANOVA**
FC1. Administrative and organizational efficiency of the university	3.77	$3.65^{1} < 3.75^{2} < 3.85^{3}$	8.114***
FC2. Offer of professional and academic development	3.38	$3.39^{1} \approx 3.39^{1} \approx 3.37^{1}$	.183

Component	Overall Mean	Year of Study 1 | 2 | 3 | 4 | 5	ANOVA
FC1. Administrative and organizational efficiency of the university	3.77	$3.87^{2} > 3.66^{1} \approx 3.64^{1} < 3.97^{2} > 3.60^{1}$	18.940***
FC2. Offer of professional and academic development	3.38	$3.49^{2} > 3.33^{1} \approx 3.29^{1} < 3.45^{2} > 3.20^{1}$	9.088***
Component	**Overall Mean**	**NPS D | PS | P**	**ANOVA**
FC1. Administrative and organizational efficiency of the university	3.77	$3.21^{1} < 3.80^{2} < 4.27^{3}$	480.341***
FC2. Offer of professional and academic development	3.38	$2.92^{1} < 3.36^{2} < 3.86^{3}$	326.185***

Legend:
FC – component of functioning of universities during the COVID-19 pandemic
Gender: F – female; M – male
Study Mode: FT – Full-time; PT – Part-time
Type of Degree Program: E – Eng.; BA – Bachelor's; MA – Master's
Year of Study: 1 – first year of first-degree studies; 2 – second year of first-degree studies; 3 – third year of first-degree studies; 4 – first year of second-degree studies; 5 – first year of second-degree studies
NPS – Net Promotor Score; D – Detractors; PS – Passively satisfied; P – Promoters
^{1,2,3} – group membership – the higher the value, the higher the average in the group
Statistical significance (p-value): ***p≤0.001, *p≤0.01, p≤0.05

Analysis of these results reveals the following patterns regarding university functioning during the COVID-19 pandemic:

a) Female respondents rated both components higher than male respondents.
b) Part-time students rated both components higher than full-time students.
c) The highest rating for administrative and organizational efficiency was observed among master's degree students.
d) First-year students, both at the first-degree and second-degree levels, rated both components higher than students in other years.
e) In terms of the NPS framework, promoters had the highest ratings, followed by passively satisfied respondents, whose ratings were higher than those of detractors.

The significance of the identified components related to the functioning of universities during the COVID-19 pandemic was then compared between female and male groups. The obtained results are presented in Table 6.

Table 6. Comparison of university functioning components during the COVID-19 pandemic between female and male groups.

Component	Female			Male		
	Overall Mean	Study Mode FT | PT	test-t	Overall Mean	Study Mode FT | PT	test-t
FC1. Administrative and organizational efficiency of the university	3.83	$3.79^1 < 3.94^2$	-3.565***	3.65	$3.63^1 \approx 3.70^1$	-1.113
FC2. Offer of professional and academic development	3.43	$3.38^1 < 3.54^2$	-3.591***	3.29	$3.31^1 \approx 3.24^1$	.968
Component	**Female**			**Male**		
	Overall Mean	Type of Degree Program E | BA | MA	ANOVA	Overall Mean	Type of Degree Program E | BA | MA	ANOVA
FC1. Administrative and organizational efficiency of the university	3.83	$3.70^1 < 3.81^2 \approx 3.90^2$	4.983**	3.65	$3.58^1 \approx 3.63^1 \approx 3.74^1$	1.881
FC2. Offer of professional and academic development	3.43	$3.41^1 \approx 3.44^1 \approx 3.42^1$	.152	3.29	$3.37^1 \approx 3.29^1 \approx 3.24^1$	.898
Component	**Female**			**Male**		
	Overall Mean	Year of Study 1 | 2 | 3 | 4 | 5	ANOVA	Overall Mean	Year of Study 1 | 2 | 3 | 4 | 5	ANOVA
FC1. Administrative and organizational efficiency of the university	3.83	$3.92^2 > 3.75^1 \approx 3.69^1 < 4.01^2 > 3.65^1$	11.444***	3.65	$3.77^2 > 3.49^1 \approx 3.54^1 < 3.89^2 > 3.46^1$	7.951***
FC2. Offer of professional and academic development	3.43	$3.54^2 \approx 3.40^2 > 3.27^1 < 3.51^2 > 3.25^1$	7.967***	3.29	$3.38^2 \approx 3.20^2 \approx 3.31^2 \approx 3.34^2 > 3.07^1$	2.697*
Component	**Female**			**Male**		
	Overall Mean	NPS D | PS | P	ANOVA	Overall Mean	NPS D | PS | P	ANOVA
FC1. Administrative and organizational efficiency of the university	3.83	$3.28^1 < 3.82^2 < 4.32^3$	333.317***	3.65	$3.10^1 < 3.77^2 < 4.16^3$	146.266***
FC2. Offer of professional and academic development	3.43	$2.95^1 < 3.37^2 < 3.92^3$	241.478***	3.29	$2.87^1 < 3.35^2 < 3.72^3$	85.028***

Legend:
FC – component of functioning of universities during the COVID-19 pandemic
Study Mode: FT – Full-time; PT – Part-time
Type of Degree Program: E – Eng.; BA – Bachelor's; MA – Master's
Year of Study: 1 – first year of first-degree studies; 2 – second year of first-degree studies; 3 – third year of first-degree studies; 4 – first year of second-degree studies; 5 – first year of second-degree studies
NPS – Net Promotor Score; D – Detractors; PS – Passively satisfied; P – Promoters
$^{1, 2, 3}$ – group membership – the higher the value, the higher the average in the group
Statistical significance (p-value): ***p≤0.001, *p≤0.01, p≤0.05

Analysis of the results for university functioning during the COVID-19 pandemic revealed the following patterns:

a) Among female students, part-time students rated both components higher than full-time students. For male students, no statistically significant differences were observed.
b) Female students in bachelor's and master's programs rated administrative and organizational efficiency higher than female students in engineering programs; no significant differences were found among male students.
c) First-year female students, at both undergraduate and graduate levels, rated both components higher than females in other years. Among male students, this pattern was observed only in administrative and organizational efficiency (for professional and academic development, the lowest ratings came from males in the final year of graduate studies).
d) In terms of the NPS framework, promoters rated both components highest, followed by passively satisfied respondents, whose ratings were higher than those of detractors. This pattern was consistent across both female and male groups.

Next, the ratings of components related to the organization and delivery of online classes at universities during the COVID-19 pandemic were compared across selected respondent groups. The results are presented in Table 7.

Table 7. Comparison of components related to the organization and delivery of online classes at universities during the COVID-19 pandemic between selected groups of respondents.

Component	Overall Mean	Gender F | M	test-t
OC1. Technical and didactic support in remote education	3.84	3.882 > 3.741	4.343***
OC2. Atmosphere and practical value of online education	3.68	3.762 > 3.511	5.888***
Component	**Overall Mean**	**Study Mode FT | PT**	**test-t**
OC1. Technical and didactic support in remote education	3.84	3.771 < 4.012	-7.158***
OC2. Atmosphere and practical value of online education	3.68	3.571 < 3.952	-8.525***
Component	**Overall Mean**	**Type of Degree Program E | BA | MA**	**ANOVA**
OC1. Technical and didactic support in remote education	3.84	3.681 < 3.822 < 3.923	10.953***
OC2. Atmosphere and practical value of online education	3.68	3.481 < 3.662 ≈ 3.772	9.440***

Component	Overall Mean	Year of Study 1 | 2 | 3 | 4 | 5	ANOVA
OC1. Technical and didactic support in remote education	3.84	3.962 > 3.721 ≈ 3.681 < 3.992 > 3.701	20.937***
OC2. Atmosphere and practical value of online education	3.68	3.843 > 3.582 > 3.431 < 3.903 > 3.421	23.129***
Component	**Overall Mean**	**NPS D | PS | P**	**ANOVA**
OC1. Technical and didactic support in remote education	3.84	3.301 < 3.862 < 4.333	501.817***
OC2. Atmosphere and practical value of online education	3.68	3.021 < 3.722 < 4.263	415.620***

Legend:
OC – component of organization and delivery of online classes at universities during the COVID-19 pandemic
Gender: F – female; M – male
Study Mode: FT – Full-time; PT – Part-time
Type of Degree Program: E – Eng.; BA – Bachelor's; MA – Master's
Year of Study: 1 – first year of first-degree studies; 2 – second year of first-degree studies; 3 – third year of first-degree studies; 4 – first year of second-degree studies; 5 – first year of second-degree studies
NPS – Net Promotor Score; D – Detractors; PS – Passively satisfied; P – Promoters
$^{1, 2, 3}$ – group membership – the higher the value, the higher the average in the group
Statistical significance (p-value): ***p≤0.001, *p≤0.01, p≤0.05

Analysis of these results concerning the organization of online classes during the COVID-19 pandemic revealed the following patterns:

a) Female respondents rated both components higher than male respondents.

b) Part-time students rated both components higher than full-time students.

c) In terms of technical and didactic support in remote education, master's students provided the highest ratings, followed by bachelor's students, with the lowest ratings from students in engineering degree programs. For atmosphere and practical value of online education, ratings from master's and bachelor's students were higher than those from engineering students.

d) First-year students, both undergraduate and graduate, rated both components higher than students in other years.

e) In terms of recommendation likelihood in the NPS framework, the highest ratings were given by promoters, followed by passively satisfied respondents, with the lowest ratings from detractors.

Additionally, the ratings of components related to the organization and delivery of online classes at universities during the COVID-19 pandemic were compared between female and male groups. The obtained results are presented in Table 8.

Table 8. Comparison of components related to the organization and delivery of online classes at universities during the COVID-19 pandemic between groups of male and female respondents.

Component	Female			Male		
	Overall Mean	Study Mode FT | PT	test-t	Overall Mean	Study Mode FT | PT	test-t
OC1. Technical and didactic support in remote education	3.88	$3.80^{1} < 4.10^{2}$	-7.568***	3.74	$3.71^{1} < 3.82^{1}$	-1.746*
OC2. Atmosphere and practical value of online education	3.76	$3.65^{1} < 4.06^{2}$	-7.993***	3.51	$3.43^{1} < 3.72^{1}$	-3.536***
Component	**Female**			**Male**		
	Overall Mean	**Type of Degree Program E | BA | MA**	**ANOVA**	**Overall Mean**	**Type of Degree Program E | BA | MA**	**ANOVA**
OC1. Technical and didactic support in remote education	3.88	$3.73^{1} < 3.86^{2} \approx 3.96^{2}$	6.938***	3.74	$3.61 \approx 3.74 \approx 3.81$	2.650
OC2. Atmosphere and practical value of online education	3.76	$3.52^{1} \approx 3.75^{2} \approx 3.85^{2}$	7.288***	3.51	$3.43 \approx 3.49 \approx 3.60$	1.376
Component	**Female**			**Male**		
	Overall Mean	**Year of Study 1 | 2 | 3 | 4 | 5**	**ANOVA**	**Overall Mean**	**Year of Study 1 | 2 | 3 | 4 | 5**	**ANOVA**
OC1. Technical and didactic support in remote education	3.88	$4.01^{2} > 3.78^{1} \approx 3.70^{1} < 4.05^{2} > 3.74^{1}$	14.851***	3.74	$3.87^{2} > 3.61^{1} \approx 3.63^{1} < 3.89^{2} > 3.57^{1}$	6.288***
OC2. Atmosphere and practical value of online education	3.76	$3.92^{2} > 3.66^{2} \approx 3.50^{1} < 3.98^{2} > 3.51^{1}$	17.178***	3.51	$3.66^{2} > 3.43^{1} \approx 3.29^{1} < 3.73^{2} > 3.18^{1}$	6.498***
Component	**Female**			**Male**		
	Overall Mean	**NPS D | PS | P**	**ANOVA**	**Overall Mean**	**NPS D | PS | P**	**ANOVA**
OC1. Technical and didactic support in remote education	3.88	$3.34^{1} < 3.87^{2} < 4.38^{3}$	362.310***	3.74	$3.24^{1} < 3.84^{2} < 4.22^{3}$	140.352***
OC2. Atmosphere and practical value of online education	3.76	$3.13^{1} < 3.77^{2} < 4.31^{3}$	268.304***	3.51	$2.84^{1} < 3.63^{2} < 4.15^{3}$	143.110***

Legend:
OC – component of organization and delivery of online classes at universities during the COVID-19 pandemic
Study Mode: FT – Full-time; PT – Part-time
Type of Degree Program: E – Eng.; BA – Bachelor's; MA – Master's
Year of Study: 1 – first year of first-degree studies; 2 – second year of first-degree studies; 3 – third year of first-degree studies; 4 – first year of second-degree studies; 5 – first year of second-degree studies
NPS – Net Promotor Score; D – Detractors; PS – Passively satisfied; P – Promoters
$^{1, 2, 3}$ – group membership – the higher the value, the higher the average in the group
Statistical significance (p-value): ***p≤0.001, *p≤0.01, p≤0.05

Analysis of the results based on the division into female and male groups evaluating the organization and delivery of online classes during the COVID-19 pandemic reveals the following patterns:

a) Part-time students rated both components higher than full-time students in both female and male groups.
b) Among female students, those in bachelor's and master's programs rated university preparedness higher than those in engineering programs. No statistically significant differences were observed among male students.
c) First-year students, both undergraduate and graduate, rated both components higher than students in other years in both gender groups.
d) Promoters gave the highest ratings, passively satisfied respondents gave moderate ratings, and detractors gave the lowest ratings, consistent across both female and male groups.

The final two steps of the research procedure involved assessing the likelihood of university students recommending their institutions to friends or acquaintances. An analysis of the distribution of responses regarding the likelihood of recommendation in selected respondent groups is presented in Table 9.

Table 9. Assessment of the likelihood of university students recommending their institution to friends or acquaintances.

Occurrence of recommendation	Total N (%)	Gender N(%)		Study Mode N(%)		Type of Degree Program N(%)			Year of Study N(%)				
		F	M	FT	PT	E	BA	MA	1	2	3	4	5
none	95 (3.4)	57 (3.0)	38 (4.0)	54 (2.6)	41 (5.3)	8 (2.5)	48 (2.9)	39 (4.5)	15 (1.6)	19 (2.7)	33 (6.8)	14 (3.1)	14 (5.6)
2	72 (2.5)	50 (2.6)	22 (2.3)	44 (2.1)	28 (3.6)	6 (1.9)	41 (2.5)	25 (2.9)	16 (1.7)	16 (2.3)	16 (3.3)	13 (2.9)	11 (4.4)
3	109 (3.8)	71 (3.8)	38 (4.0)	80 (3.9)	29 (3.7)	13 (4.1)	52 (3.2)	44 (5.1)	25 (2.6)	34 (4.8)	15 (3.1)	16 (3.5)	19 (7.6)
4	133 (4.7)	86 (4.5)	47 (5.0)	106 (5.2)	27 (3.5)	13 (4.1)	82 (5.0)	38 (4.4)	38 (4.0)	37 (5.3)	28 (5.8)	20 (4.4)	10 (4.0)
5	208 (7.3)	138 (7.3)	70 (7.4)	159 (7.7)	49 (6.3)	31 (9.7)	118 (7.2)	59 (6.8)	59 (6.2)	48 (6.8)	47 (9.8)	32 (7.1)	22 (8.8)
6	292 (10.3)	180 (9.5)	112 (11.9)	218 (10.6)	74 (9.5)	33 (10.3)	180 (10.9)	79 (9.1)	87 (9.2)	88 (12.5)	54 (11.2)	40 (8.8)	23 (9.2)
7	438 (15.5)	291 (15.4)	147 (15.6)	333 (16.2)	105 (13.5)	54 (16.9)	290 (17.6)	94 (10.8)	147 (15.5)	118 (16.8)	88 (18.3)	63 (13.9)	22 (8.8)

8	551 (19.5)	363 (19.2)	188 (20.0)	412 (20.1)	139 (17.8)	65 (20.4)	320 (19.5)	166 (19.1)	189 (20.0)	134 (19.1)	94 (19.5)	92 (20.3)	42 (16.9)
9	424 (15.0)	299 (15.8)	125 (13.3)	324 (15.8)	100 (12.8)	51 (16.0)	250 (15.2)	123 (14.2)	170 (18.0)	108 (15.4)	51 (10.6)	58 (12.8)	37 (14.9)
one hundred percent	510 (18.0)	357 (18.9)	153 (16.3)	323 (15.7)	187 (24.0)	45 (14.1)	264 (16.0)	201 (23.2)	200 (21.1)	100 (14.2)	56 (11.6)	105 (23.2)	49 (19.7)
Total	2832 (100.0)	1892 (100.0)	940 (100.0)	2053 (100.0)	779 (100.0)	319 (100.0)	1645 (100.0)	868 (100.0)	946 (100.0)	702 (100.0)	482 (100.0)	453 (100.0)	249 (100.0)
Level of loyalty	**Total N (%)**	**Gender N(%)**		**Study Mode N(%)**		**Type of Degree Program N(%)**			**Year of Study N(%)**				
		F	**M**	**FT**	**PT**	**E**	**BA**	**MA**	**1**	**2**	**3**	**4**	**5**
Detractors	909 (32.1)	582 (30.8)	327 (34.8)	661 (32.2)	248 (31.8)	104 (32.6)	521 (31.7)	284 (32.7)	240 (25.4)	242 (34.5)	193 (40.0)	135 (29.8)	99 (39.8)
Passively satisfied	989 (34.9)	654 (34.6)	335 (35.6)	745 (36.3)	244 (31.3)	119 (37.3)	610 (37.1)	260 (30.0)	336 (35.5)	252 (35.9)	182 (37.8)	155 (34.2)	64 (25.7)
Promoters	934 (33.0)	656 (34.7)	278 (29.6)	647 (31.5)	287 (36.8)	96 (30.1)	514 (31.2)	324 (37.3)	370 (39.1)	208 (29.6)	107 (22.2)	163 (36.0)	86 (34.5)
Total	2832 (100.0)	1892 (100.0)	940 (100.0)	2053 (100.0)	779 (100.0)	319 (100.0)	1645 (100.0)	868 (100.0)	946 (100.0)	702 (100.0)	482 (100.0)	453 (100.0)	249 (100.0)
NPS	25 (0.9)	74 (3.9)	-49 (-5.2)	-14 (-0.7)	39 (5.0)	-8 (-2.5)	-7 (-0.4)	40 (4.6)	130 (13.7)	-34 (-4.8)	-86 (-17.8)	28 (6.2)	-13 (-5.2)

Legend:
Gender: F – female; M – male
Study Mode: FT – Full-time; PT – Part-time
Type of Degree Program: E – Eng.; BA – Bachelor's; MA – Master's
Year of Study: 1 – first year of first-degree studies; 2 – second year of first-degree studies; 3 – third year of first-degree studies; 4 – first year of second-degree studies; 5 – first year of second-degree studies
NPS –Net Promoter Score

In the first part of Table 9, the distribution of responses regarding the likelihood of recommending their university is shown across groups of students overall, and separately by gender, study mode (full-time or part-time), type of degree program (engineering, bachelor's, or master's), and year of study. The analysis reveals positive NPS values in the following groups: overall (+0.9%), female students (+3.9%), part-time students (+5.0%), master's students (+4.6%), and first-year students of both first-degree studies (+13.7%) and second-degree studies (+6.2%). It should be noted that these positive NPS values are relatively small – except for first-year first-degree students – which may suggest a declining tendency for students to recommend their universities as the duration of their studies increases.

In the final step of the analysis, Spearman's rank correlation coefficients were calculated to verify the relationship between the level of student loyalty and components related to the functioning, organization, and delivery of online classes during the COVID-19 pandemic. The obtained results are presented in Table 10.

Table 10. Correlation between the level of student loyalty and components related to the functioning, organization, and delivery of online classes at the university during the COVID-19 pandemic.

Component	Level of loyalty (NPS)		
	Overall	F	M
FC1. Administrative and organizational efficiency of the university	.514***	.523***	.497***
FC2. Offer of professional and academic development	.433***	.451***	.411***
OC1. Technical and didactic support in remote education	.522***	.538***	.507***
OC2. Atmosphere and practical value of online education	.472***	.469***	.460***

Component	Overall									
	F	M	E	BA	MA	1	2	3	4	5
FC1. Administrative and organizational efficiency of the university	.553***	.505***	.505***	.509***	.522***	.520***	.478***	.502***	.503***	.549***
FC2. Offer of professional and academic development	.485***	.355***	.355***	.444***	.443***	.449***	.426***	.400***	.383***	.459***
OC1. Technical and didactic support in remote education	.564***	.479***	.479***	.506***	.561***	.517***	.464***	.497***	.506***	.622***
OC2. Atmosphere and practical value of online education	.509***	.431***	.431***	.461***	.503***	.454***	.399***	.475***	.464***	.611***
Component	**Female**									
	F	M	E	BA	MA	1	2	3	4	5
FC1. Administrative and organizational efficiency of the university	.495***	.588***	.469***	.503***	.565***	.528***	.466***	.492***	.518***	.601***
FC2. Offer of professional and academic development	.429***	.500***	.311***	.463***	.472***	.468***	.458***	.376***	.407***	.473***
OC1. Technical and didactic support in remote education	.512***	.610***	.472***	.507***	.599***	.520***	.450***	.496***	.530***	.694***

OC2. Atmosphere and practical value of online education	.443***	.531***	.386***	.445***	.526***	.426***	.371***	.497***	.447***	.648***
Component	**Male**									
	F	**M**	**E**	**BA**	**MA**	**1**	**2**	**3**	**4**	**5**
FC1. Administrative and organizational efficiency of the university	.499***	.474***	.542***	.519***	.412***	.496***	.515***	.517***	.468***	.394***
FC2. Offer of professional and academic development	.371***	.445***	.404***	.401***	.369***	.393***	.377***	.454***	.335***	.414***
OC1. Technical and didactic support in remote education	.496***	.458***	.474***	.503***	.457***	.498***	.498***	.505***	.445***	.413***
OC2. Atmosphere and practical value of online education	.493***	.451***	.481***	.495***	.440***	.501***	.460***	.429***	.479***	.517***

Legend:
Statistical significance (p-value): ***p≤0.001, *p≤0.01, p≤0.05
Gender: F – female; M – male
Study Mode: FT – Full-time; PT – Part-time
Type of Degree Program: E – Eng.; BA – Bachelor's; MA – Master's
Year of Study: 1 – first year of first-degree studies; 2 – second year of first- degree studies; 3 – third year of first- degree studies; 4 – first year of second- degree studies; 5 – first year of second- degree studies
NPS –Net Promoter Score

All Spearman's rank correlation coefficients presented in Table 10 are statistically significant, confirming the presence of relationships between the level of loyalty (as measured using NPS) and the evaluated areas related to the functioning, organization, and delivery of online classes at the university during the COVID-19 pandemic. Among the components related to university functioning, higher correlation values with loyalty are generally observed for FC1 ("Administrative and organizational efficiency of the university") than for FC2 ("Offer of professional and academic development"); an exception to this pattern is observed in the evaluations of students in the final year of second-degree studies.

Regarding the organization and delivery of online classes, the correlation values with loyalty are generally higher for OC1 ("Technical and didactic support in remote education") than for OC2 ("Atmosphere and practical value of online education").

5. Discussion

The study conducted assessed the functioning of higher education institutions in Poland during the COVID-19 pandemic, with a particular focus on university operations as well as the organization and delivery of online classes. Analysis of the results highlighted varied student opinions, which can be grouped into several key areas.

Firstly, in terms of administrative and organizational support, universities were rated relatively high ($\bar{x}$ = 3.77); notably, female students and part-time students expressed higher satisfaction with the functioning of universities than male students and full-time students. This suggests that these demographic groups may have experienced better alignment between their expectations and the administrative responses of universities during the pandemic.

Similarly, technical and didactic support was also rated highly ($\bar{x}$ = 3.84), particularly concerning access to materials, platform functionality, and instructor willingness to collaborate and provide responses. Lower ratings were observed for professional and academic development opportunities ($\bar{x}$ = 3.38) and for the atmosphere and practical value of online classes ($\bar{x}$ = 3.68), with master's and bachelor's students expressing greater satisfaction than engineering students.

In terms of student loyalty, NPS analysis suggests that first-year undergraduate and second-year graduate students exhibit higher loyalty levels. While NPS values were positive, they were generally relatively low, which may indicate a decline in satisfaction as studies progress. This trend warrants further empirical investigation to explore its causes and potential remedies. These observations are further supported by factors influencing loyalty levels – the strongest correlations with student loyalty were observed for FC1. Administrative and organizational efficiency of the university and OC1. Technical and didactic support in remote education. Notably, higher correlation values were found among female students and part-time students.

6. Limitations and future research directions

This study has a number of limitations. The first pertains to its geographic scope: the survey was carried out solely among Polish students; therefore, its findings may contribute to the scientific discussion on evaluating actions taken by HEIs during the COVID-19 pandemic, but the conclusions are only locally applicable. Additionally, the respondents were students of economics programs, which further narrows the scope. Expanding the study to include students from other disciplines and incorporating a broader set of variables is recommended to enhance the applicability of the findings.

A number of avenues remain open for future research. First, attention could be directed toward analyzing long-term relationships between online education and loyalty (especially considering the observed declines in loyalty in later years of study). Such longitudinal studies could provide insights into the potential for a lasting relationship between remote education experiences and students' perceptions of their studies, and, consequently, their loyalty. Comparative studies focusing on differences between universities in Poland and abroad could also be beneficial, identifying the most effective practices in online education. Additionally, the role of social interactions and psychological support could be analyzed, particularly regarding the role of atmosphere and interaction in online education. Qualitative research would be especially suitable for exploring the impact of limited interaction on student motivation.

From the perspective of recommendation likelihood, an interesting research direction could involve evaluating the effectiveness of various hybrid education models. This could be informed by variations in satisfaction based on the type of degree program (engineering, bachelor's, and master's), with specific attention to verifying how different hybrid models cater to student needs according to the nature of their study programs. Furthermore, applying loyalty indicators to assess specific universities could provide deeper insights: the results from ANOVA analyses and statistically significant correlation findings suggest the utility of NPS in evaluating university preparedness. Exploring diverse educational environments unique to different higher education institutions could be insightful in this regard.

Conducting further research in these areas would enable higher education institutions to better tailor management strategies and online class organization to student expectations, ultimately increasing loyalty toward universities in evolving educational contexts.

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