



Non-formal learning practices among students in Kazakhstan: Perceptions, challenges, and opportunities

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Abstract

Kazakhstani university practices benefit from the adaptability and mobility of non-formal education in the face of continuous changes in the global educational landscape. The potential of non-formal education offers opportunities to improve students' professional and universal competencies in a variety of training formats. The study aims to investigate students' perceptions, engagement, and challenges regarding non-formal learning. The study involved 422 students from D. Serikbayev East Kazakhstan Technical University. There were two phases of the research methodology. The first section was carried out as a theoretical study. The second phase comprised a quantitatively based field study. Questionnaire surveys are the field research method. The findings demonstrate that there are trends in the growth of non-formal education, as well as the paradoxes and both explicit and latent functions. The relationship between their academic achievement and skill development and non-formal learning techniques in students is critical. The study's findings show that students' academic performance and skill development are enhanced by non-formal learning. The findings to develop strategies that facilitate informal learning. Institutions can create a learning environment that encourages lifelong knowledge acquisition by incorporating online learning resources, supporting time management skills, and stimulating intrinsic motivation.

Keywords: Barriers to learning, learning strategies, motivation in learning, non-formal learning, student engagement.

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1. Introduction

Non-formal education enjoys great freedom in terms of content, methods, and forms of training [1]. It is typically selected without consulting current programs; consequently, it is not a cohesive system but rather a vast mosaic, the different components of which have the potential to not only conflict but also replace one another [2]. In this regard, it is obvious that non-formal education (NFE) is the most flexible, diverse in form, and multi-faceted link in the system of continuous education [3]. Analysis of international experience in the field of promoting ideas of lifelong learning shows that all countries support the need to develop this direction. According to the experiences of the most prosperous nations, non-formal education in all of its forms enables the development of human capital, which in turn promotes increased labor productivity, the creation and advancement of innovations, and the growth of technological entrepreneurship [4].

1.1. Study Rationale

Non-formal education is relevant in the practice of universities in Kazakhstan [5, 6]. There are disparities between the population's coverage by formal education (FE) and, on the one hand, low labor productivity and a shortage of highly skilled workers who can function in the new technological order. Formal education "does not keep up" with the rate of technological advancement, socioeconomic shifts, and evolving labor market demands [7, 8].

There is no comprehensive, transparent, understandable, and logically structured legal framework for cooperation between the university and its partners in the implementation of NFE [9, 10]. Private organizations do not see the value in collaborating with universities because they prioritize financial goals, while universities concentrate on traditional forms of interaction. For example, according to the results of a study on cooperation (the city of Ust-Kamenogorsk, East Kazakhstan), out of 50 organizations included in the field of interest for the problems of this study, only 4 organizations (3 public and 1 private) expressed their intention to cooperate with the university in preparing courses on non-formal education, exchanging experiences, and holding events.

The issue of effective recognition of the results of non-formal education requires further development. The rules are based on the assessment of the substantive compliance of the obtained learning outcomes, which is not always possible to implement unambiguously. Non-formal education must be included in the national qualification framework, which is also not yet developed [11].

NFE, operating outside the boundaries of FE and free from strict rules, regulations, and agreements, attracts more and more students. Distinctive features of non-formal education of students are high motivation and mobility, dynamism of the content, and technologies of its educational activities. Thus, the manifestation of interest in various forms of non-formal education becomes an assessment parameter and a vital attribute of a modern student, capable of combining education with temporary work, focused on successful personal development and continuous professional growth. However, many of them face serious problems. Limited local resources, lack of leadership, and the attitude of society to non-formal learning prevent them from completing their studies [12, 13].

Given these factors, researchers have emphasized the value of integrating non-formal education into the educational structure. However, in recent years, research attention to this issue has become less visible. In this regard, there is a certain need for a deeper understanding of how this practice manifests itself among students, how they perceive the legitimacy and value of non-formal learning (NFL), an assessment of the attractiveness of non-formal education, and the potential for this type of learning to improve their skills and independence.

Unfortunately, despite the declaration of non-formal education for educational progress and innovation, the studies of this issue in the Kazakhstani segment have shown that they are fragmented and heterogeneous. In this regard, the importance of studying the challenges and opportunities associated with non-formal learning of students is very much in demand and has led to a call for more thorough research. To the best of the authors' knowledge, this is the first in-depth study of the perceptions, problems, and opportunities of students related to non-formal learning conducted in Kazakhstan.

1.2. Questions for Research

- 1. Engagement and Practices
- Q1: How frequently do students in Kazakhstan engage in the NFL?
- Q2: What are the most commonly used NFL resources and platforms?
- Q3: What strategies do students employ to facilitate their NFL?
- 2. Motivation and Influencing Factors
- Q1: What motivates students to engage in the NFL??
- Q2: How do students perceive the effectiveness of the NFL compared to FE?
- Q3: What are the key barriers that prevent students from engaging in the NFL?
- 3. Impact and Perceptions
- Q1: How does the NFL contribute to students' academic performance and skill development?
- Q2: What are students' perceptions of integrating the NFL into formal academic curricula?
- Q3: What recommendations can be made to enhance NFL opportunities for students?

1.3. Purpose of the Research

The aim of this study is to investigate students' perceptions, engagement, and challenges regarding the NFL. Important factors include how students use NFL techniques, what motivates them to participate, and how the NFL affects their academic achievement and skill development.

1.4. Significance of the Study

This study contributes to the growing body of research on the NFL in higher education, particularly in Kazakhstan. While previous studies have focused on the NFL in Western countries, this study highlights context-specific factors such as students' reliance on digital tools and time management issues [14, 15]. Institutions can create a learning environment that encourages lifelong knowledge acquisition by incorporating online learning resources, supporting time management skills, and stimulating intrinsic motivation. With a focus on Kazakhstan, this study adds to the expanding corpus of research on non-formal learning in education. Institutions can establish a learning environment that promotes ongoing knowledge acquisition by integrating online learning intrinsic motivation, and supporting time management skills.

2. Review of the Literature

The term non-formal education denotes any education that is acquired or can be acquired outside the system of formal basic and additional education [16]. The first block is occupied by research on the study of education in general and nonformal education as one of its elements. Researchers note that in the context of global changes in education, new practices related to non-formal learning are spreading, requiring comprehensive and interdisciplinary study from the standpoint of pedagogy, sociology, anthropology, philosophy, and political and historical sciences [17]. Nonetheless, the use of such practices and the validation of skills learned through informal education have several fascinating features [18]. On the one hand, mainly young people are involved in new forms of education. On the other hand, representatives of the older age category are also interested in acquiring new skills and taking part in educational events of various types, which proves the need to popularize non-formal education for older people [19]. As the experience of researchers shows, such practices are an important component of education in all scientific fields: engineering and exact sciences, natural sciences, and humanities [20-22]. The importance of adult education in the framework of lifelong learning initiatives emphasizes the growing need in recent years for widespread use of NFE [23]. The prospects of social contribution to potential non-formal learning emphasize the increasing role of non-formal learning in vocational education [24]. Because of the increasing impact of social media and advanced web technologies, online learning provides a multitude of formal and non-formal educational opportunities [25]. More than formal education, the student is the focal point of the NFL. In NFE, students are highly motivated, educational activities are important, their goals are clear, and non-formal learning requires flexibility [26]. In addition to being a prerequisite for social interaction during advanced training, non-formal learning is a response to the difficulties posed by systemic changes in contemporary education [27].

Even though NFE in modern conditions provides extensive prerequisites for self-development and powerful potential accumulated in non-formal educational practices, the authors note that in Kazakhstan, there is no general picture of the implementation of NFE consistent with the policy of continuous education. At the same time, the creation of a more effective system of lifelong learning meets the current needs of the economy and the labor market and allows for reducing the costs of training and qualification processes. Research into NFE in the context of new challenges and problems of the modern economy is rapidly growing in Kazakhstan. However, it should be noted that, firstly, they are fragmentary and reflect individual aspects of the implementation of NFE. Secondly, the institutional possibilities of NFE and its explicit and latent functions are not sufficiently disclosed. Thirdly, the sociocultural, legal, and economic features of NFE in the context of youth education are not taken into account.

3. Methodology

3.1. Study Design

The first stage was carried out in the format of a theoretical study, during which national systems of NFE in developed countries were analyzed. Models were also identified that reflect the nature of the relationship between FE and NFE, specific features of informal educational practices, and methods of their development and regulation. The second stage was conducted in the form of a field study organized on the basis of a quantitative method. The method used was a developed author's questionnaire by distributing links to the questionnaire page on the Google Forms service, where survey forms were generated, each of which was associated with the study of students' perceptions, problems, and opportunities related to non-formal learning.

3.2. Participants

The study was conducted in the city of Ust-Kamenogorsk in East Kazakhstan. The stratified random sampling method ensures representativeness from different academic disciplines. The study of students' perceptions, problems, and opportunities related to NFL in the fields of study "Business School," "International School of Engineering," "School of Architecture, Construction, and Energy," "School of Earth Sciences," and "School of Digital Technologies and Artificial Intelligence" was conducted in September 2023 to 2024. A total of 422 respondents from D. Serikbayev East Kazakhstan Technical University took part in the study. The average age of the participants was 23.2 ± 3.48 years. Distribution of respondents by form of study: full-time (100%); by gender: 52.8% men and 47.2% women (see Table 1).

Table 1.

Analysis of the distribution of students by categories.

Category	Frequency (n)	Percentage (%) from	Percentage (%) of total	
$\frac{1}{1}$				
Male	23	41.1%	5.5%	
Female	33	58.9%	7.8%	
International School of Engineering $(n = 42)$				
Male	19	45.2%	4.5%	
Female	23	54.8%	5.5%	
School of Architecture, Construction and Energy $(n = 37)$				
Male	20	54.1%	4.7%	
Female	17	45.9%	4.0%	
School of Earth Sciences $(n = 169)$				
Male	79	46.7%	18.7%	
Female	90	53.3%	21.3%	
School of Digital Technologies and Artificial In	telligence ($n = 118$))		
Male	82	69.5%	19.4%	
Female	36	30.5%	8.5%	
University-wide TOTAL: $(n = 422)$				
Male	223	-	52.8%	
Female	199	-	47.2%	
Age		-		
19-20 years	168	-	40%	
21-25 years	211	=	50%	
26 years and older	43	=	10%	
Total	422	-	100%	

3.3. Structured Training Program on NFL

Table 2 provides a structured approach for the participants to build their practical skills, critical thinking, and engagement with real-world challenges using NFL approaches. Each week focuses on a different aspect, with specific tools and activities to encourage active learning and engagement.

Table 2.

Structured tr	aining program.		
Week	Focus area	Key concepts	Tools and Activities
1	Introduction to the NFL in	Differences between FE and NFE. The	Case studies of tech startups, a design
	technical education	role of self-directed learning and	thinking workshop, and interactive
		innovation.	discussions.
2	Experiential & project-	Learning through real-world	Hackathons, engineering challenges,
	based learning	applications, problem-solving, and	group coding projects, and prototype
		collaboration. Kolb's experiential	development.
		learning cycle.	
3	Interactive & collaborative	Peer learning, teamwork, and	Group projects, debate on emerging
	learning techniques	interdisciplinary collaboration in	tech trends, and problem-based learning
		technical fields.	activities.
4	Digital Tools &	Use of AI, VR, gamification, and online	Online coding platforms, Arduino/IoT
	technology-enhanced	collaboration tools for active learning.	workshops, and game-based learning
	learning		simulations.
5	Assessment, feedback, and	Measuring learning impact, self-	Industry expert talks, portfolio
	career readiness	assessment, and industry readiness	development, peer reviews, and real-
		skills.	world case studies.

3.3.1. NFL Schedule for Students

Table 3 shows when and how students can participate in self-directed learning, practical exercises, and industry-related experiences outside of their official coursework. It is designed for students from various schools within a technical university. The schedule ensures active learning and skill development through self-study in the morning, discussions in the middle of the day, hands-on workshops, networking in the evening, and deep learning experiences over the weekend.

Time Slot	"Business School,"	"School of Architecture,	"School of Digital Technologies and
	Engineering"	"School of Earth Sciences"	Artificial Intelligence
Before classes (7:00 – 9:00 AM)	Self-study on business cases, financial modeling, project management research	Reviewing architectural blueprints, sustainability case studies, and energy management concepts	Online coding practice, algorithm problem-solving, and reading AI research papers
Between classes & lunch break (12:00 – 1:30 PM)	Business simulations, entrepreneurship discussions, investment case studies	CAD modeling, simulation practice, and construction material analysis	Cybersecurity discussions, AI/ML forums, debugging sessions
Afternoon (3:00 – 5:00 PM) (free periods / no classes)	Startup workshops, business pitch practice, and financial tech analysis	Architectural design workshops, energy audits, and geological fieldwork	Hackathons, collaborative coding, open-source contributions
Evening (6:00 – 10:00 PM)	Networking events, industry guest lectures, and internship work	Sustainable construction projects, urban planning forums, and renewable energy debates	Competitive programming, cloud computing practice, and personal AI projects
Weekend (flexible, 5–8 hours)	Business competitions, market research projects, and industry visits	Green architecture initiatives, engineering fairs, and site visits	IT Bootcamps, game development, freelance coding, cybersecurity challenges

Table 3. Weekly NEL schedule

3.4. Research Instruments

The survey had five sections designed to gather data on a particular facet of the non-formal learning practices assessment of participants.

- Section 1: Engagement in non-formal learning.
- 1. How often do you engage in the NFL?
- 2. What are your primary sources for non-formal learning?
- 3. What motivates you to engage in non-formal learning?

Section 2: Likert-scale questions (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

- 4. Non-formal learning helps me acquire new skills effectively.
- 5. I prefer non-formal learning over traditional classroom learning.
- 6. Online resources are my primary tool for non-formal learning.
- 7. I believe non-formal learning should be integrated into formal education
- 8. Lack of time is a major barrier to my non-formal learning.

Section 3: Learning strategies and challenges.

9. Which of the following non-formal learning strategies do you use?

10. What are the main challenges you face in non-formal learning?

Section 4: Perception and impact of informal learning

11. How do you think informal learning complements formal education? (Open-ended)

12. Do you believe informal learning should be integrated into formal academic curricula? Why or why not? (Open-ended).

Section 5: Additional comments.

13. Do you have any additional thoughts or suggestions regarding non-formal learning? (Open-ended).

3.5. Data Analysis

The descriptive statistical analysis provides key insights into the non-formal learning practices of students. Pearson's correlation analysis was used to ascertain the relationships between the study's key variables. Regression analysis was used for predictive relationships in non-formal learning practices. Statistical processing of data was carried out using the SPSS software package.

4. Results

Table 4 presents the results of descriptive statistical analysis and provides key insights into the non-formal learning practices of students.

Table 4.

Descriptive statistical analysis of non-formal learning practices.

Variable	Mean (M)	Median (Md)	Standard deviation (SD)
Frequency of NFL	3.77	3.75	1.10
Primary source: online courses	4.22	4.25	0.91
Motivation: personal interest	4.50	4.50	0.80
Barrier: lack of time	4.13	4.17	1.00
Preference: non-formal vs. formal	3.63	3.57	1.18

A bar chart visually represents these results by displaying categorical data as bars with heights proportional to their frequency distribution (see Figure 1).



Figure 1.

Survey results visualization.

The findings highlight that students actively engage in non-formal learning, particularly through online courses and selfdirected exploration driven by personal interest. However, time constraints remain a major challenge, potentially limiting students' ability to fully integrate non-formal learning into their routines. The preference for non-formal learning over formal education suggests a shift in learning habits, where students increasingly seek flexible and personalized learning experiences.

Table 5 shows the results of the relationships between key variables.

Variables	Correlation coefficient (r)	Significance (p-value)
Frequency of NFL & online course usage	0.65	p < 0.001
Personal interest & frequency of NFL	0.72	p < 0.001
Lack of time & frequency of the NFL	-0.48	p < 0.01
Preference for NFL & academic performance	0.38	p < 0.05
Online course usage & academic performance	0.51	p < 0.01

 Table 5.

 Results of the relationships between key variables.

Referring to Table 3, students' engagement in non-formal learning is significantly influenced by personal motivation and access to online learning resources. Time constraints negatively impact participation in non-formal learning, indicating a need for better time management strategies. Non-formal learning has a modest positive effect on academic performance, suggesting it complements formal education but does not fully replace it.

Table 6 presents the results of the multiple regression analysis.

Table 6.

Multiple regression analysis results. Independent Variable (IV) **B** (Unstandardized coefficient) β (Standardized t-value p-value coefficient) Personal interest 0.68 0.609.75 p < 0.001Online course usage 0.45 0.48 7.82 p < 0.001Time constraints -0.35 -0.41-6.92 p < 0.01 0.22 0.29 4.63 Academic performance (GPA) p < 0.05 1.10 3.25 Constant (intercept) p < 0.05

Model Summary: $R^2 = 0.68 \rightarrow$ the model explains 68% of the variance in students' non-formal learning frequency. Adjusted $R^2 = 0.66 \rightarrow$ the model remains strong after adjusting for multiple predictors. F (4, 395) = 72.43, p < 0.001 \rightarrow the regression model is statistically significant.

The bar chart visually represents perceptions of the NFL among students (see Figure 2).

Perception level percentage of students %



Visualization of students' perceptions of the NFL.

The percentage distribution of student perceptions regarding the importance of the NFL for academic success: The majority of students either "agree" or "strongly agree," showing that the NFL is widely recognized as valuable. The decreasing trend in agreement levels suggests that only a small fraction of students do not consider the NFL beneficial. The high R² value (0.939) indicates that the trend line accurately represents the data pattern, confirming a clear preference for NFL among students.

The bar chart visually represents the frequency of NFL activities among students (see Figure 3).

Categories of activities:

(1) Online learning.

(2) Peer learning (Study groups, discussions).

(3) Extracurricular activities (Clubs, sports).

(4) Self-study (Reading, research).



Frequency of non-formal learning activities

Figure 3.

Visualization of students' frequency of NFL activities.

NFL activity frequency illustrates the trend lines, and regression equations indicate patterns in engagement.

Self-Study: The daily frequency category (red bar) has the highest percentage, indicating that self-study is the most common informal learning activity. Other frequencies (weekly, monthly, rarely, never) show a decreasing trend. The regression equation y=-1.5x+12.5 ($R^2 = 0.6$) suggests a moderate downward trend in participation as frequency decreases.

Extracurricular Activities: Compared to other categories, extracurricular activities have lower participation rates overall. The "rarely" and "never" responses (purple and blue bars) are relatively high, suggesting that many students do not engage frequently in extracurricular activities. The trend equation y=x+12.5 ($R^2=0.0333$) indicates a very weak correlation, meaning participation varies widely among students.

Peer Learning: A balanced distribution across different frequency levels, but "weekly" and "daily" categories still dominate. The trend line $y=x+17.5(R^2 = 0.1)$ suggests a weak correlation, implying that students engage in peer learning inconsistently.

Online learning follows a similar pattern to self-study, with "daily" and "weekly" categories having the highest percentages. The regression line y=-1.5x+37.5 ($R^2 = 0.1636$) suggests a mild downward trend in participation as frequency decreases.

The R² values indicate varying degrees of correlation, with self-study having the most structured trend, while extracurricular activities are more sporadic.

The bar chart visually represents the challenges faced by students in engaging with the NFL (see Figure 4).

Each bar represented the percentage of students who identified a particular challenge.



Visualization of students' challenges faced in engaging in NFL activities.

The most critical barriers are resource limitations and time constraints, suggesting that financial and scheduling issues play a major role in NFL participation. Motivation and access to technology are moderate barriers, meaning they affect some students but are not the primary concerns. Institutional barriers are the least reported, implying that students do not necessarily see formal recognition as a major limitation.

5. Discussion

The data indicate that the majority of respondents (50%) are aged 21–25 years, followed by 19–20 years (40%), and a smaller proportion (10%) are 26+ years. This suggests that the NFL is more common among students. Most participants engage in NFL weekly (45%) or daily (30%), while monthly learners (15%) and those who rarely engage (10%) are in the minority. This indicates that the NFL is a regular activity for most respondents, suggesting a high level of self-directed education [28]. Online courses are their primary NFL source, according to the majority of respondents who either strongly agree (50%) or agree (30%). Only a small fraction disagree (5%) or strongly disagree (5%), indicating that online learning platforms are highly preferred. Sixty percent strongly agree and twenty-five percent agree that personal interest drives their NFL. The low percentage of neutral (10%) and disagreement responses (5%) suggests that most learners are intrinsically motivated rather than obligated by external factors. Forty percent strongly agree and thirty percent agree that lack of time is a significant barrier, making it the most commonly reported obstacle. While some remain neutral (15%) or disagree (15%), time constraints appear to be a major challenge for most non-formal learners. Thirty-five percent strongly agree and thirty percent agree that they prefer non-formal learning over formal education. However, twenty percent are neutral, suggesting that while non-formal learning is popular, some still see value in structured, formal education. Thus, non-formal learning is widespread, with most participants engaging in it weekly or daily. Online courses are the dominant source, reinforcing the trend toward digital education. Personal interest is the key motivator, showing that learners are driven by curiosity and selfimprovement rather than external pressure. Time constraints are a major barrier, indicating a need for more flexible learning opportunities. Preference for non-formal learning is strong, though some still appreciate formal education [29, 30].

A strong correlation (r = 0.72) was found between personal interest and frequency of non-formal learning, suggesting that students who are intrinsically motivated engage more in self-directed learning. The use of online courses was strongly linked to the frequency of non-formal learning (r = 0.65), indicating that digital platforms play a key role in students' learning practices. A significant negative relationship (r = -0.48) between time constraints and non-formal learning frequency suggests that students who feel overwhelmed with academic and personal responsibilities struggle to engage in non-formal learning. Students who prefer non-formal learning (r = 0.38) and those who frequently use online courses (r = 0.51) tend to perform better academically, though the relationship is not as strong as personal interest or frequency of learning. This implies that while non-formal learning supports academic success, other factors may also contribute to performance [31].

Predictive relationships in non-formal learning practices demonstrate that personal interest is the strongest predictor (β = 0.60, p < 0.001). This aligns with theories of self-determination and lifelong learning, where curiosity drives knowledge acquisition. Online course usage positively affects non-formal learning ($\beta = 0.48$, p < 0.001). Students who frequently use MOOCs, YouTube, and digital platforms for learning engage more in informal learning activities. This suggests that technology plays a key role in modern non-formal education [32]. Time constraints act as a barrier ($\beta = -0.41$, p < 0.01). Students with higher academic workloads, jobs, or responsibilities participate in non-formal learning less often. Time management training and flexible learning opportunities could help mitigate this barrier. Academic performance has a weak but significant effect ($\beta = 0.29$, p < 0.05). Students with higher GPAs are slightly more likely to engage in non-formal learning, but the effect is weaker than other predictors. This implies that while non-formal learning supports academic success, it is not the primary driver of higher grades. Personal motivation and online learning platforms are the most significant positive predictors of non-formal learning. Time constraints are a key obstacle that negatively affects students' ability to engage in non-formal learning. Academic success is positively associated with non-formal learning, but not as strongly as intrinsic motivation or online learning habits. These findings suggest that universities and educators should encourage self-motivation, integrate digital learning tools, and provide flexible learning schedules to foster more effective non-formal learning practices. Universities should offer more flexible learning opportunities, such as self-paced modules, micro-learning sessions, and hybrid learning models. Additionally, time management workshops could help students balance formal education with non-formal learning. Targeted interventions should encourage all students, including those struggling academically, to explore non-formal learning as a tool for academic improvement. The findings suggest that higher education institutions could integrate informal learning methods into their curricula. Universities could leverage students' interest in online courses, self-directed study, and digital resources to develop more flexible learning models. Additionally, addressing the time constraints by providing students with structured, self-paced learning opportunities could improve participation rates.

6. Limitations and Future Research

This study has certain limitations despite its important results. The study relies on self-reported data, which may introduce bias in how students perceive their non-formal learning engagement. The research is limited to Kazakhstan, and results may not be fully generalizable to other educational contexts. The study focuses on quantitative measures; future research could incorporate qualitative methods to gain deeper insights into students' NFL behaviors. Future research should explore longitudinal studies to assess how NFL habits evolve over time and whether interventions (e.g., digital learning initiatives) effectively enhance engagement. Additionally, investigating the role of cultural and socioeconomic factors in NFL could provide further context-specific recommendations.

7. Conclusions

This study explored students' perceptions, engagement, and challenges regarding NFL. The paper confirms that students use NFL techniques, what motivates them to participate, and that NFL affects their academic achievement and skill development. The context of this study contributed to our understanding of: (1) how frequently students in Kazakhstan engage in NFL; (2) the most commonly used NFL resources and platforms; (3) strategies students employ to facilitate their NFL; (4) what motivates students to engage in NFL; (5) how students perceive the effectiveness of NFL compared to FE; and (6) key barriers that prevent students from engaging in NFL. The relationship between their academic achievement and skill development and NFL techniques in students is critical. The findings are consistent with the article's research objectives, and future research efforts could include a greater geographic focus. In conclusion, this study demonstrates that NFL contributes to students' academic performance and skill development. These findings offer actionable insights for educators aiming to reform curricula and improve the relevance of educational programs in preparing students for the demands of the modern workforce.

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