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INVESTIGATING INTERNET DEPENDENCY AMONG UKRAINIAN YOUTH: BEHAVIORAL ANALYSIS AND SEGMENTATION

ДОСЛІДЖЕННЯ ІНТЕРНЕТ-ЗАЛЕЖНОСТІ СЕРЕД МОЛОДІ УКРАЇНИ: ПОВЕДІНКОВИЙ АНАЛІЗ І СЕГМЕНТАЦІЯ

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Abstract. *The study focuses on a comprehensive analysis of the phenomenon of internet addiction among Ukrainian youth in the context of rapid digitalization and social instability. The relevance of the work is driven by the need to understand the transformation of behavioral patterns among young people who use digital space as a primary environment for social interaction and education. The empirical part of the research was conducted using structured Google Forms, which allowed for the collection of high-quality data from 405 respondents, including students and educators from various regions of Ukraine. The analysis covers key indicators such as average daily time spent online, the functional purpose of using network resources, and the presence of psycho-emotional or social symptoms of dependency.*

A significant part of the study is devoted to data processing using machine learning techniques. Specifically, by applying the k-means clustering algorithm, the authors identified and characterized four distinct profiles of internet users. The first cluster, defined as "addicted," is characterized by uncontrolled time spent online (over 8 hours per day) and the replacement of real-life social functions with virtual ones. The second, "high-risk" group, shows signs of emerging psychological dependence. The third and fourth clusters represent "balanced" and "conscious" users, respectively, who demonstrate a pragmatic approach to digital tools with minimal negative impact on their daily productivity and mental health.

The results of the study reveal a direct correlation between the duration of stay in the digital environment and the level of social alienation. The scientific novelty of the work lies in the empirical validation of the cluster structure of internet addiction during the period of martial law in Ukraine, which imposes additional psychological stress on the youth. The practical value of the findings is reflected in the proposed individualized preventive strategies. These interventions are designed to shift the focus from restrictive measures to the development of digital hygiene and emotional self-regulation, providing a basis for effective social and psychological support for young people at risk.

Анотація. *Дослідження присвячене комплексний аналізу феномену інтернет-залежності серед української молоді в умовах стрімкої цифровізації та соціальної нестабільності. Актуальність роботи зумовлена необхідністю розуміння трансформації поведінкових патернів молодих людей, які використовують цифровий простір як основне середовище для соціальної взаємодії, дозвілля та навчання. Емпірична частина дослідження була проведена за допомогою структурованих Google-форм, що дало змогу зібрати якісні дані від 405 респондентів, серед яких переважну більшість склали студенти та викладачі з різних регіонів України. Аналіз*

охоплює ключові показники, такі як середньодобовий час перебування в мережі, функціональне призначення використання мережевих ресурсів, а також наявність психоемоційних або соціальних симптомів залежності.

Значна частина дослідження присвячена обробці даних із застосуванням методів машинного навчання. Зокрема, шляхом застосування алгоритму кластеризації k-середніх (k-means), авторами було виявлено та охарактеризовано чотири чіткі профілі користувачів інтернету. Перший кластер, визначений як «залежні», характеризується неконтрольованим часом перебування в мережі (понад 8 годин на добу) та заміщенням реальних соціальних функцій віртуальними. Друга група — «група ризику» — демонструє ознаки формування психологічної залежності та часткову втрату контролю над часом. Третій та четвертий кластери представляють «збалансованих» та «свідомих» користувачів відповідно, які демонструють прагматичний підхід до цифрових інструментів із мінімальним негативним впливом на їхню повсякденну продуктивність та ментальне здоров'я.

Результати дослідження виявили пряму кореляцію між тривалістю перебування в цифровому середовищі та рівнем соціального відчуження. Наукова новизна роботи полягає в емпіричному підтвердженні кластерної структури інтернет-залежності в період воєнного стану в Україні, що накладає додатковий психологічний стрес на молодь. Практична цінність отриманих результатів відображена у запропонованих індивідуалізованих стратегіях профілактики. Ці заходи спрямовані на зміщення акценту з обмежувальних методів на розвиток цифрової гігієни та емоційної саморегуляції, що стає основою для ефективної соціально-психологічної підтримки молоді в сучасних умовах.

Keywords: clustering, gamers, computer games, gaming culture, gamedev, web questionnaire, K-means method, Internet addiction, Google Forms, data analysis, digital behavior, procrastination, social networks.

Ключові слова: кластеризація, геймери, комп'ютерні ігри, ігрова культура, gamedev, веб-опитувальник, метод K-means, інтернет-залежність, Google Forms, аналіз даних, цифрова поведінка, прокрастинація, соціальні мережі.

1. INTRODUCTION

The Internet has become an integral part of modern life. It has penetrated all spheres: from work and study to communication and entertainment. Today, we do more than just use the Internet - it defines our lifestyle. Online, we search for information, shop, watch movies, communicate with friends and even build a career. The online space is a powerful tool that, if used wisely, opens up endless horizons. But it is important to remember that the Internet is a part of life, not its meaning.

The annual report from *We Are Social and Hootsuite*, usually published in January, is one of the most comprehensive and up-to-date sources of statistics on the global use of the Internet, social media, mobile devices and digital technologies [1]. These annual reports are published to provide the public with a clear picture of how the digital world is developing.

The We Are Social and Hootsuite report for January 2024 (the most recent one available) shows how rapidly the influence of digital technologies in our lives is growing. Today, more than 5.52 billion people use the Internet, which is 67.5% of the world's population (an annual increase of approximately 100 million users). This figure continues to grow due to the expansion of Internet access in developing countries.

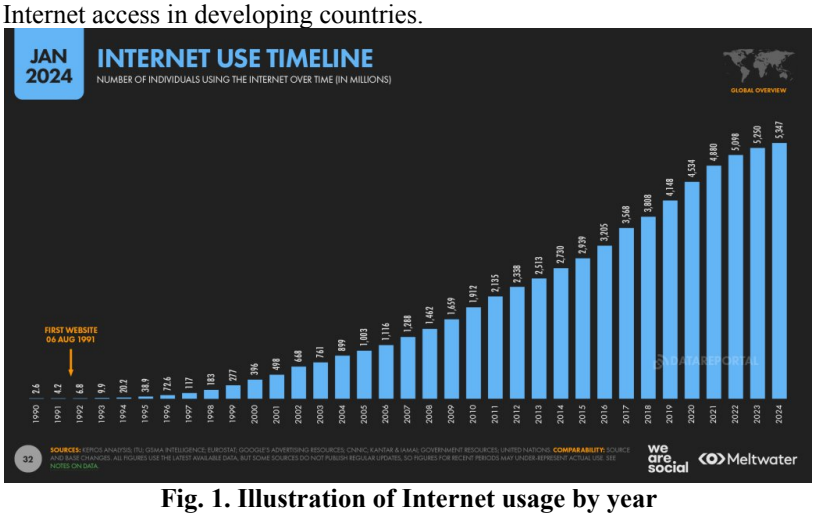

Fig. 1. Illustration of Internet usage by year

The average user spends around 6 hours and 36 minutes online each day, highlighting its importance in everyday life. There are over 5 billion active social media users, representing approximately 63% of the world's population. Facebook, YouTube, Instagram and TikTok remain the leaders of these platforms, with the average time spent on social media being around 2 hours and 25 minutes per day. People spend an average of 6 hours and 36 minutes per day online, equivalent to nearly 46 hours per week.

Most of this time is spent searching for information, watching videos and streaming services, reading news and using social media. Social media continues to be a key channel for communication, entertainment and marketing. However, it

should be noted that the differences in average internet usage in this report vary significantly depending on the country of residence.

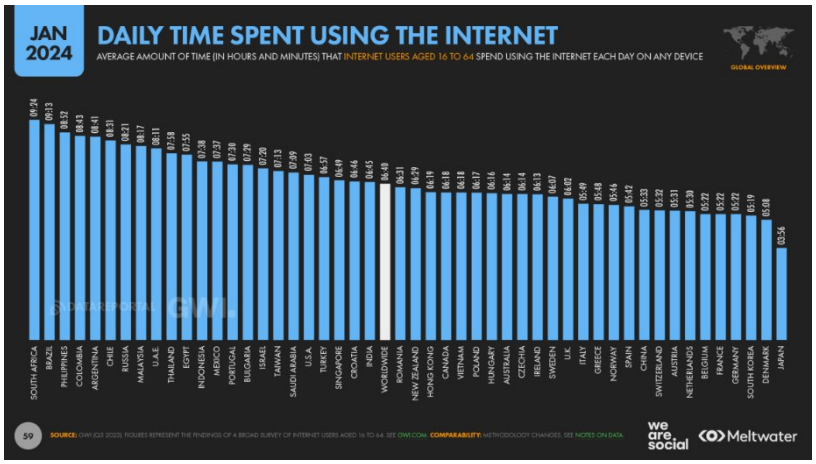

Fig. 2. Average Internet usage time by country

Average time spent online varies by country due to many factors that influence availability, habits, and purposes of online use. Average time spent online varies by country due to many factors that influence availability, habits, and purposes of online use. In countries with a developed digital infrastructure, people have fast, reliable, and relatively inexpensive access to the Internet. This allows them to use it more often and for a variety of purposes, from work to entertainment. At the same time, in countries with less developed economies and infrastructure, access to the network may be limited, which reduces the average time spent online. The culture and habits of the population also play an important role. For example, in Asia, the Internet is often used for online games, which increases the time spent online. In Europe, it is more often a tool for work and education, which makes use more purposeful. The age of the population is another factor. In countries with a young population, such as India or Indonesia, the Internet is actively used for communication, watching videos, and playing games. In countries with an older population, online activity may be lower.

Social and economic conditions also influence the time spent online. Where offline entertainment or social opportunities are limited, the Internet becomes the main means of leisure. In addition, the spread of remote work and online learning increases the average time spent online in countries where these practices are developed.

Availability of mobile Internet plays a significant role. In regions where smartphones are the main device for accessing the Internet, people use the Internet more often, especially for social media and instant messaging. Thus, differences in average Internet usage time reflect the level of digitalization, social habits and economic situation of countries, creating a unique picture for each of them. It was also concluded that the older the population of a country, the less time residents spend on the Internet.

However, these studies do not distinguish between "productive" and "unproductive" use of this time. They provide general statistics without assessing the nature or quality of time spent online [1]. The Internet has become an integral part of our lives, providing enormous opportunities for work, learning and self-development. However, it is important to understand the difference between time spent productively on the Internet and time wasted. Productive use of the Internet can include learning new material, completing work tasks, taking online courses, or searching for useful information. This time produces concrete results that help improve skills, achieve goals, and expand your horizons.

At the same time, the Internet can easily become a trap for wasting time. Scrolling through endless social media feeds, watching meaningless videos, or surfing uncontrollably can take up hours without leaving anything of value behind. Such habits not only eat up time, but can also leave you feeling tired, irritated, or dissatisfied. It is especially dangerous when the habit of spending many hours online becomes an addiction. Internet addiction is a condition that can occur with prolonged and uncontrolled use of the Internet [2,3]. The Internet offers many exciting opportunities, such as social networks, video games, and streaming services, which can easily take up your attention for hours. When a person spends a significant amount of time on the Internet, they may gradually begin to feel a loss of control over their actions and time spent online.

2. MATERIALS AND METHODS

The main cause of Internet addiction is the reward mechanism that is built into most online activities [3]. For example, getting likes on social networks or achieving success in a game causes the release of dopamine, the pleasure hormone. Gradually, the brain begins to associate Internet use with positive emotions, and a person increasingly seeks to return to this source of pleasure. This can lead to an increase in online time, neglect of other things and a deterioration in the quality of life.

Spending many hours online is especially dangerous, as it destroys the balance between virtual and real life. A person may begin to postpone important tasks, lose interest in hobbies and live communication. The psychological state also suffers: long-term use of the Internet is associated with increased anxiety, depression and emotional exhaustion [8, 9].

Internet addiction develops imperceptibly, but its consequences can be serious [4]. It is important to recognize the signs of this condition: a feeling of irritation or anxiety when there is no access to the Internet, an inability to limit online time, neglect of important aspects of life for the sake of being online. To avoid addiction, it is necessary to set clear boundaries in Internet use and regularly pay attention to offline activities that bring joy and satisfaction. The following types of Internet addictions are distinguished [4, 7, 8, 9 13]:

Social Media: The Like Trap. One of the most common forms of addiction is social media addiction. This is the desire to be constantly "connected", checking notifications, posting, and following others. Many people experience a fear of missing out or a feeling that they are not successful enough, comparing themselves to the "perfect" picture of others' lives. This can lead to wasted time, distance from real-life communication, and even lower self-esteem.

An addictive gaming world. Another common type is gaming addiction, especially in multiplayer online games. Here, players are immersed in virtual worlds where they can become heroes, gain recognition, or achieve goals that are difficult to achieve in real life. Such games often absorb time that could be spent working, studying, or socializing. This can lead to health problems, decreased physical activity, and even financial difficulties due to in-game purchases.

An endless stream of information. Some people experience an irresistible craving for constant searching and consumption of information. They read articles, blogs, watch educational videos without stopping, even when the information becomes redundant. This causes brain overload, memory impairment, and the inability to focus on a specific task. A seemingly useful habit turns into a brake on personal effectiveness.

Video: Screen bingeing. Video content addiction is another form that many people face. People endlessly watch videos on YouTube, TikTok, or TV series on streaming platforms. One video replaces another, and time passes unnoticed. This is often accompanied by sleep disturbances and decreased productivity, because watching content becomes a priority over work.

Communication that becomes obsessive. Messengers and chats can also be addictive. The desire to be "in touch" with friends or colleagues, instantly respond to messages and check chats turns into an obsessive habit. As a result, real communication fades into the background, and the feeling of anxiety increases if someone does not respond quickly enough.

Shopping without borders. Online shopping, with its ease and accessibility, can become a source of addiction. People spend hours browsing products, looking for discounts and promotions, and then buy things they do not even need. This gives temporary pleasure, but often leads to financial problems and a feeling of guilt.

Gambling: the illusion of winning. Online gambling, be it sports betting, casinos or lotteries, also often becomes a problem. Gambling and the illusion of quick money draw people in, forcing them to spend more and more money. Financial losses, debts and stress in personal life become inevitable companions of such hobbies.

The world of virtual relationships. Some find solace in cybersex addiction, immersing themselves in pornographic content, virtual novels or intimate video chats. This leads to problems in real relationships, decreased interest in a partner and psychological difficulties.

Each of these forms of Internet addiction is unique and affects a person's life in different ways. However, they all have one thing in common: excessive passion for Internet activities leads to a loss of balance between virtual and real life [7, 13]. The modern approach to this problem does not involve completely abandoning the Internet. It is important to learn to use technology consciously so that it remains a tool for improving life, and not a replacement for it. This is the key to harmonious interaction with the digital world [4, 7].

The study of Internet addiction remains relevant in our time, despite the many publications in this area, for several reasons. First of all, the Internet and technology are developing rapidly, and the forms of their use are constantly changing. Social networks, streaming platforms, mobile applications and online games are introducing new mechanisms for retaining users. These changes require regular study, as they create new challenges in understanding addiction [4, 11 12, 14].

In addition, Internet addiction remains a difficult to diagnose phenomenon. Although various tests and methods have been developed, there is still no single recognized diagnostic standard. This complicates the work of clinicians and researchers, especially when comparing data from different countries and cultures. Each new step in the study of Internet addiction helps to clarify the criteria and develop more accurate diagnostic tools [3].

Another reason for the relevance is that Internet addiction is increasingly affecting different age groups. If previously the main attention was paid to adolescents and young people, now researchers are noting an increase in addiction among young children, as well as adults and the elderly. This requires adaptation of approaches to studying addiction depending on the characteristics of the audience [10, 11].

Cultural differences also play an important role. The way people use the internet varies greatly across regions, so addiction research must take into account local characteristics and contexts. This is especially important in the context of globalization, where internet access is expanding even in the most remote corners of the planet [1]. Finally, internet addiction research is relevant because of its consequences. It affects not only mental health, but also social interactions, productivity, and family relationships. Each new scientific finding helps to develop more effective methods of prevention and treatment, as well as inform society about the risks [2, 3].

The study of Internet addiction among Ukrainian youth is aimed at identifying the level of addiction, factors

influencing its formation, and possible consequences of this phenomenon. Of particular value is the online survey using Google forms, which allows collecting data directly from the target audience and analyzing them in the context of modern realities [4, 8, 9].

Purpose and objectives of the study. The purpose of this work is to analyze the manifestations of Internet addiction among Ukrainian youth, identify the main trends and features, and offer recommendations for minimizing negative consequences.

To achieve this goal, the following ***tasks*** were defined:

1. conduct a review of theoretical sources and existing research on the topic of Internet addiction,
2. develop a questionnaire for an Internet survey using Google forms,
3. collect data covering age and regional characteristics of Ukrainian youth,
4. conduct a statistical analysis of the collected data and identify the level of Internet addiction among respondents,
5. determine the main factors contributing to the formation of Internet addiction.

The object of the study is the youth audience of Ukraine. ***The subject*** is the influence of Internet addiction on psychological and social state. The following ***methods*** were used to implement the set tasks:

1. theoretical analysis — study of scientific literature devoted to the problem of Internet addiction, and analysis of the results of previous studies,
2. questionnaire — development and implementation of an online survey using Google forms, aimed at collecting data from the youth audience of Ukraine,
3. statistical analysis — processing and interpretation of the collected data using quantitative analysis methods, including calculation of percentages, identification of correlations and comparison of results for different groups,
4. comparative method — comparison of the obtained data with the results of studies in other countries and regions.

Using online surveys to study Internet addiction is one of the most effective methods. This is due to the fact that such surveys make it easy to reach the target audience - active Internet users. People who spend a lot of time on the Internet are more likely to agree to take part in online studies, which makes the sample more representative and relevant for analysis [4, 7, 8].

In addition, online surveys provide a wide coverage, covering participants from different regions and countries. This is especially important for studying addiction, which can manifest itself differently depending on cultural and social characteristics. The online format simplifies the organization of surveys, making them cost-effective and fast. Questionnaires can be distributed instantly, and data collection and analysis occurs almost in real time.

Such surveys are also convenient for participants. People can answer questions at a time and place convenient for them, which increases the likelihood of frank and accurate answers. The anonymity provided by online surveys is especially important when discussing the topic of addictions. It helps respondents feel more comfortable, which leads to more honest answers.

Online surveys fit perfectly into the context of studying Internet addiction, as they allow the integration of additional data on the digital behavior of participants. For example, researchers can collect information about respondents' preferences in using social networks or analyze their time spent online. This provides a deeper understanding of the problem.

Automation of data processing in online surveys is also a big plus. The results are immediately collected in digital format, which speeds up statistical analysis and makes it easier to find patterns. Thus, online surveys are becoming a convenient and effective tool for studying Internet addiction, especially considering that they fit into the familiar digital world of the target audience.

The Young test and the Chen scale have been developed for a long time to create such surveys for studying Internet addiction [5, 6]. The Kimberly Young Internet Addiction Test (IAT) is a psychological tool created to assess a person's level of addiction to the Internet. It was developed in 1998 and is widely used for diagnostics and research in this area. The Young Internet Addiction Test helps to understand how much the Internet affects a person’s life and daily habits. This test includes 20 questions that assess a person’s behavior, emotions, and attitudes toward time spent online. Each question requires an assessment on a scale of 1 to 5, where 1 means “never” and 5 means “very often.” The topics of the questions cover important aspects of life: how much the Internet interferes with social connections, affects studies or work, causes anxiety when not connected, and how often a person hides their real online time. As a result, the participant receives a total score, which can range from 20 to 100. Here are some examples of questions from the Kimberly Young Internet Addiction Test. Each question must be answered on a scale of 1 (“never”) to 5 (“very often”):

Do you feel like you spend more time online than you planned?

Do you forget about your daily responsibilities because of the time you spend online?

Do you feel irritated, anxious, or depressed when you can't use the Internet?

Do you put off important tasks to spend time online?

Do you feel like you're losing control of your time online?

The Chen Internet Addiction Scale (CIAS) is another instrument developed to diagnose Internet addiction [5, 6]. It was created for a more in-depth analysis of Internet-related behavior and is used in both clinical research and psychotherapeutic practice. It consists of 26 questions that cover different aspects of behavior and emotional state related

to online activity. The participant rates their answers on a scale of 1 to 4, where 1 means “completely disagree” and 4 means “completely agree.”

3. RESULTS

However, it is currently becoming relevant to create your own surveys on Internet addiction, because standard tests, such as Young and Chen, although still popular, do not always correspond to modern realities. These tests were developed in the era when the Internet was used differently - for text communication, web surfing or simple work. Today, people spend a lot of time on social networks, play online games, watch streaming services or constantly interact with mobile applications. Such changes require a new approach to diagnostics [1, 4, 6, 10].

Your own surveys help to study certain aspects of Internet addiction in more depth. For example, if a researcher wants to know how social media use is associated with emotional burnout or how video game addiction affects sleep, such nuances can only be taken into account in customized questions.

Local studies also require an individual approach. For analyzing Internet addiction in a specific group, for example, among university students, standard tools may be either too general or not detailed enough. A new survey can be tailored to the audience's characteristics, interests, and behavior patterns. Finally, creating your own surveys contributes to the development of science. This makes it possible to explore aspects that have not yet been studied, such as the impact of virtual reality or artificial intelligence on user behavior.

In this paper, based on Young and Chen's tests, we created our own list of questions, which was implemented as a GOOLE form and intended mainly for the youth audience of Ukraine. The main questions for the GOOLE form: Your age; Gender; Your main life focus or interests; Place of residence; Your social status; If you are a student, then ...; How many hours a day do you spend on the Internet (on average)? What are your main purposes for using the Internet?; How often do you check your phone/gadget without a specific need?; Do you feel uncomfortable when you cannot connect to the Internet?; Has the Internet interfered with your studies or personal life?; Have you put off doing important things because of spending time on the Internet?; What most often makes you spend time on the Internet?; Have you tried to limit your Internet use?; How do you feel about using applications to control your time on the Internet?; What method of combating Internet addiction is most effective for you?

Fig. 3. View of the GOOLE form for a survey to identify Internet addiction

The answers consisted of choosing one value from several proposed ones; In some places it was possible to select several values, or add your own parameter.

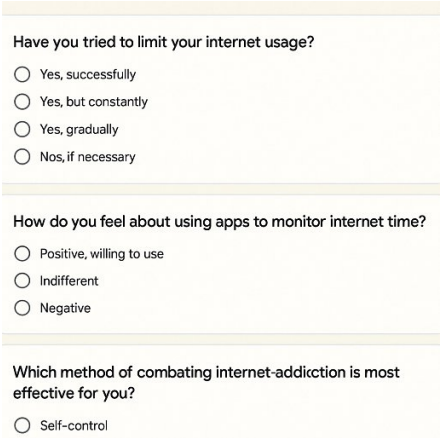

Fig. 4. Example of questions in the GOOLE form

The appearance of such a GOOLE form is shown in Fig. 3,4.

The survey involved 405 people, mainly students and teachers of the Odessa National Technological University and several colleges that are part of it. After the surveys were completed, the results were interpreted in an Excel table, the appearance of which is presented in Fig. 5. The results for individual survey items can be presented in the form of pie charts, an example of which is presented in Fig. 6.

Your age	Gender	Your main life direction or interest	Your social status	Place of residence
24 years and older	male	Technical (engineering, technology, programming)	Intellectual (lecturer, science)	Odesa
24 years and older	male	Humanities (literature, arts, psycho-logy)	Student	Odesa
24 years and older	female	Humanities (literature, arts, psychology)	Student	Odesa
24 years and older	male	Humanities (literature, arts, psychology)	Worker (manural labor)	Another city
17-20 years	female	Humanities (literature, arþchnology)	Student	Odesa
17-20 years	male	Humanities (literature, arts, psychol-ogy)	Student	Odesa
17-20 years	female		Employee (office job)	Odesa
17-20 years	female	Other (medicine, business, psycholo-	Worker	Odesa
under 17 ys	female	Technical (engineering, technology)	Employee (office job)	Odesa
17-20 years	female	Humanities (literature, arts, psychology	Employee (office job	Odesa
under 17 ys	male	Inther (medicina, business, science)	Employee	Odesa

Fig. 5. Example of outputting survey results in a table

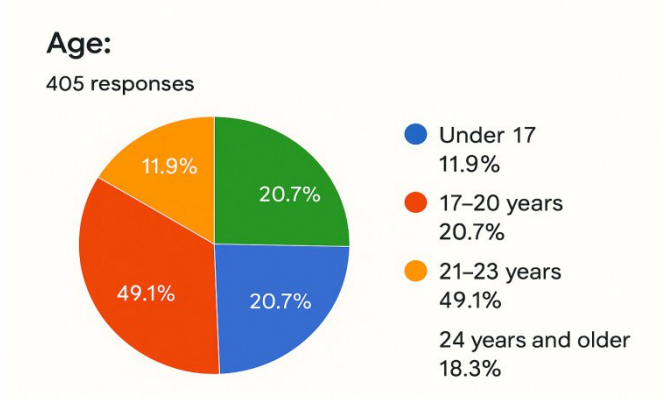

Fig. 6. Example of interpretation of survey results in the form of diagrams

The main results of the survey can be presented as follows:

1. gender: Male: 51% Female: 49%,
2. age: Under 17: 18% 17-20: 28% 21-23: 24% Over 24: 30%,
3. how many hours a day do you spend on the Internet? Less than 2 hours: 9% 3-4 hours: 27% 5-7 hours: 43% More than 7 hours: 21%,
4. what are your main purposes for using the Internet? Social networks: 79% Searching for information for study: 69% Reading news: 61% Entertainment: 47% Other: 20%,
5. how often do you check your phone/gadget without a specific need? Several times an hour: 43% Several times a day: 27% Every 5-10 minutes: 21% Less often: 9%,
6. do you feel uncomfortable without the Internet? Yes, always: 52% Sometimes: 36% No: 12%,
7. have you noticed the impact of the Internet on your studies or personal life? Never: 35% Sometimes: 28% Rarely: 26% Often: 11%,
8. have you put off important things because of the Internet? Sometimes: 34% Rarely: 29% Never: 21% Regularly: 16%,
9. have you tried to limit your Internet use? No, I don't see the need: 53% Yes, successfully: 24% Yes, but unsuccessfully: 13% No, but I plan to: 11%,
10. what is your attitude towards applications for monitoring time on the Internet? Neutral: 71% Negative: 17% Positive, ready to use: 13%,
11. what method of combating Internet addiction is most effective for you? Other: 31% Time management: 27% Changing the environment: 21% Help from friends/relatives: 15% Content blockers: 6%.

The results of the survey on Internet addiction must be processed using mathematical methods, the main ones being:

1. Descriptive statistics (calculating mean, median, mode, standard deviation, distributing responses into categories (e.g. how many students spend more than 7 hours a day online).
2. Correlation analysis (identifying relationships between variables (e.g. between time spent online and academic performance), using Pearson or Spearman correlation coefficient).
3. Group analysis (comparing different groups (e.g. students in technical and humanities fields, courses), using t-test or analysis of variance (ANOVA).
4. Clustering (grouping students by similarity of responses (e.g. "heavy addiction", "moderate use"), using cluster analysis methods, such as the k-means algorithm.

Example of data processing: an analysis of a survey by age groups on whether they tried to limit their use of the Internet was conducted. The results are presented in the form of a diagram in Fig. 7.

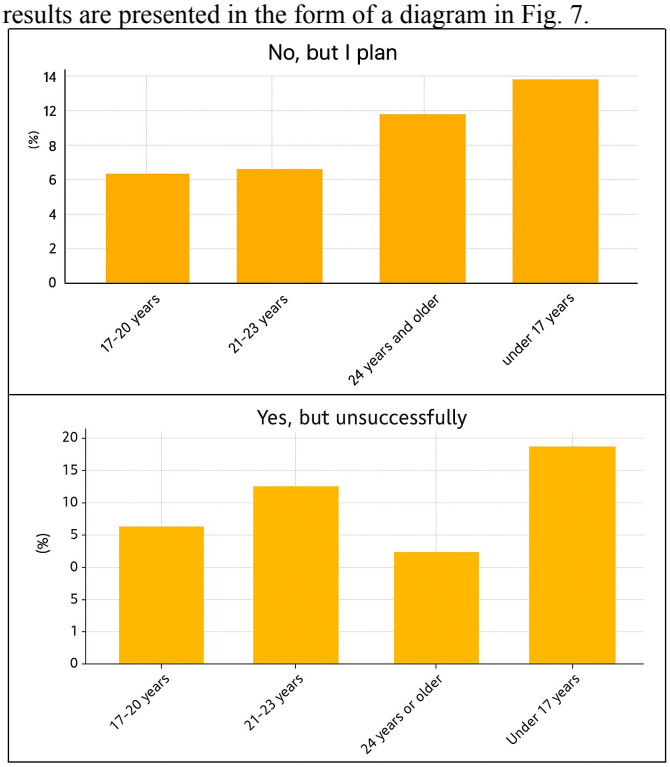

Fig. 7. Illustration of attempts to restrict internet use

The analysis of the diagrams shows that the younger age group, up to 17 years old, most often tries to limit their internet use, but often fails. This may indicate a lack of self-control or difficulties in recognizing the need for such a limitation. At the same time, there is a noticeable small percentage of those who have already successfully coped with this task, which is encouraging. Among the respondents in the older group, 24 years and older, a more balanced picture is observed. Many of them successfully limit their time on the internet, and the majority do not see the need for this at all. This may indicate a mature approach to internet use and that they have already formed habits of conscious consumption. Interestingly, the group aged 21–23 demonstrates the largest proportion of those who consider internet restrictions unnecessary. Perhaps this is due to the fact that at this age the internet is perceived as a tool for work or study, and not as a source of procrastination. However, among them there are also those who are still trying to fight addiction, although there are fewer of them than in other age groups.

Key common points that the survey revealed:

1. average time spent online: Most respondents indicated that they spend between 3 and 7 hours online daily. About 20% reported more than 7 hours per day,
2. main purposes of using the Internet: the most popular purposes are education (60%), social networks (45%) and entertainment content (40%),
3. problems associated with Internet addiction: about 50% of participants admitted that they often put off important matters because of the time spent on the Internet. More than 30% experience discomfort when there is no access to the network,
4. attempts to limit: only 20% of respondents made attempts to limit their time on the Internet, of which the majority used special time control applications,
5. effective methods of struggle: survey participants believe that support from friends and family, as well as blocking content, can be considered the most effective measures to reduce addiction.

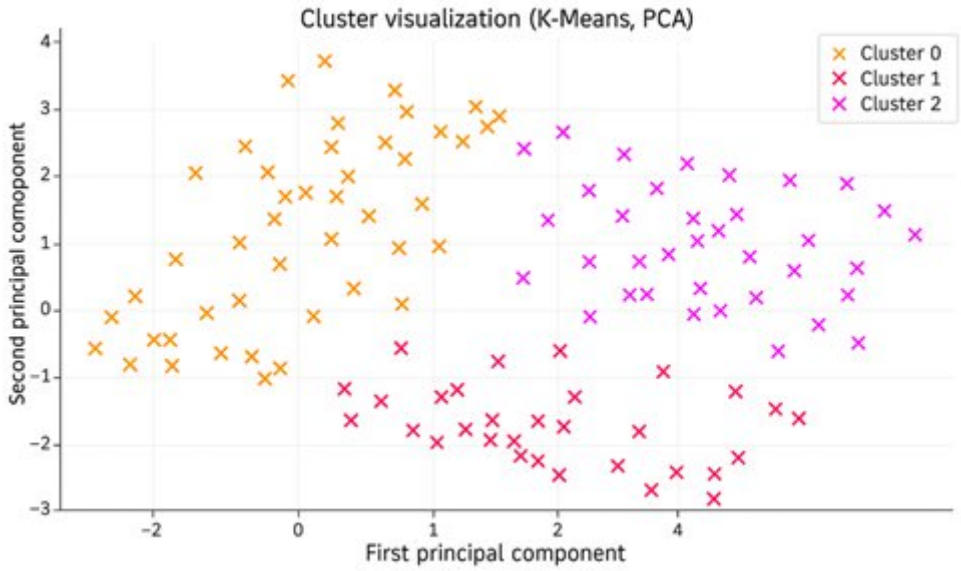

Fig. 8. Visualization of clusters using the k-means method

Clustering of the surveyed audience was also conducted [15, 17, 18]. Clustering helps to organize complex data by combining it into groups with similar characteristics. This allows for a better understanding of how different objects, be they people, events, or data, are related to each other. Another important purpose of clustering is to simplify analysis. When data is grouped into understandable groups, it is easier to focus on key points without being distracted by small details. Clustering also helps to predict the behavior of objects in one group. In addition, this method is effective for detecting anomalies. If an object appears in the data that does not fit into any group, this signals something unusual, which can be useful, for example, in security or healthcare. Ultimately, clustering becomes a tool for making more accurate and informed decisions, since it shows where the key problems lie and how they can be solved. The k-means method was used for clustering, according to which all respondents are divided into 4 clusters depending on their behavior and attitude to the Internet, the clusters are described through centroids, which show the average values for each group, each respondent is assigned to one of the clusters [16, 18, 19, 20]. The graph (Fig. 8) shows the visualization of clusters obtained by the k-means method using dimensionality reduction to two dimensions (PCA). Each color corresponds to one of the four clusters, and the dots indicate respondents.

5. CONCLUSIONS

The clustering results showed that respondents were divided into four different groups with unique characteristics. Among them, we can highlight those who demonstrate balanced use of the Internet (*Stable*). These people, mostly over 24, spend 3-4 hours a day on the Internet, rarely experience discomfort without a connection, and almost never put things off because of the time spent online. For them, Internet restrictions have either already been successfully implemented or are simply not needed.

There is another group of active users, mainly aged 17-23 (***Active***). They spend more time on the Internet - from 5 to 7 hours a day, but do not demonstrate a strong addiction. They experience a feeling of discomfort when not connected, but in a moderate form. Procrastination occurs, but is not a critical problem. These people use the Internet actively, but relatively rationally.

The younger group, consisting of teenagers under 17, is most susceptible to Internet addiction (***Addicted***). They spend more than 7 hours a day on the Internet and often experience strong discomfort if they cannot connect. They are particularly prone to procrastination: tasks are often put off because of the time spent online. Despite attempts to limit their internet use, they are rarely successful in this matter.

Finally, the group of conscious users, consisting mainly of people over 24 years old, demonstrates a mature attitude to the Internet (***Conscious***). They spend 3 to 5 hours a day online, use the Internet for work, study and searching for information, and experience virtually no discomfort without a connection. Procrastination is minimal for them, and time limits are either successfully implemented or are not perceived as necessary.

These groups show how habits and attitudes towards the Internet change with age: from addiction and excessive use to a conscious and rational approach.

The results of the entire study show that Internet addiction is a common problem among young people in Ukraine. The main factors of addiction are long-term stay online, frequent use of social networks and lack of time control. To minimize negative consequences, it is recommended to introduce educational programs on conscious use of the Internet, as well as the use of technologies for time management.

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