THE ATTITUDES OF STUDENTS TOWARD THE USE OF SMARTPHONES

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ABSTRACT

Objectives: The aim of the research was to examine the attitudes of students regarding the use of smartphones during the day and at night, their impact on the quality of sleep and the use of social networks and communication tools.

Methods: In the research, a survey questionnaire constructed for the needs of this research was used. It consisted of two independent and nine dependent variables. The research was conducted by placing a questionnaire on a Google form. 327 respondents, students studying in Croatia, took part in the research.

Findings: The results of the research show that respondents use their smartphones for an average of 3,16 hours a day; they visit the social network Instagram most often (54,1 %), and Snapchat the least (1,5 %). When communicating, most of them use WhatsApp (75,8 %), while Telegram is used by only one respondent (0,3 %). 84.1 % of respondents use their smartphone before going to sleep; almost 89 % of respondents say that their smartphone never wakes them up during the night.

Novelty: Mobile phones have become part of everyday life, especially among younger generations. The majority of communication takes place precisely through these devices, communicating through a handful of tools that are available.

KEY WORDS

tools for communication and collaboration, social networks, smartphone, students, health

CLASSIFICATION

JEL: I23, R20

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INTRODUCTION

Every day there are more and more users of social networks. They are popular with almost all age groups, especially young people, and are most often accessed via smartphones. According to data from the Statista agency [1], there were a total of 3.17 million users in Croatia in 2021, and it is predicted that the figure will grow significantly by 2025, when around 3.39 million users are predicted.

Social networks [2] were used by a total of 2.90 million users in Croatia in February 2022. The most visited social network was YouTube with a total of 2.90 million users, followed by the social network Facebook with 1.75 million users, Instagram with 1.45 million users, LinkedIn with 730 thousand users and Snapchat with a total of 550 thousand users.

Authors [3] state that young people today use technology in different ways, from writing messages to "tweeting", "chatting", playing online games and posting on various internet portals.

Considering the great popularity of social networks among young people, especially among the "Z" and "Alpha" generations, who could be said to have been "born with mobile phones in their hands". The "Z" generation, also called Gen Z, Homelanders, Centennials, iGeneration, post-millennials and zoomers, is a generation born in the late 90s and early 2000s, a generation that grew up in the iPhone age [4]. In contrast to the "Z" generation, the "Alpha" generation are members born (or those who will be born) between 2010 and 2025. The generation that first experienced remote classrooms, the generation that uses tablets, computers and ubiquitous streaming services from early childhood [5] the question arises as to how much social networks are used, for example, in educational process, and how much for the purpose of entertainment and free time. In their research authors [6] came to the conclusion that a very small percentage of young people use social networks for educational purposes. On a sample of 300 students at Prince Sattam bin Abdul Aziz University, the results were obtained that 97 % of respondents use social networks and only 1% of respondents use them for educational purposes. More than half of the respondents, 57% of them, stated that they consider themselves addicted to social networks. In a global survey conducted in 2021 [7], 33 % of respondents spend more than 3 hours a day on social networks, and the respondents stated that social networks had a negative impact on their social well-being. In 2022 [8], the average time spent on social networks was 147 minutes per day, which is ~~only~~ two minutes more than the year before.

Time spent on the Internet, considering the time spent for educational purposes and free time, is on the rise. Frequent use turns into daily activities that grow into a habit, and the habit can become risky and lead to addiction.

Some of the factors that can lead to Internet addiction [9] are individual and environmental. Individual factors refer to personality, behaviour, way of dealing with problems, ways of experiencing the world around you, etc., while environmental factors refer to the design of websites and video games that keep users online as long as possible.

In the world, there are more and more young people addicted to the Internet [10, 11], mobile phones [12, 13], fear of missing out (FOMO) [14, 15], social networks [16, 17] and the irrational fear of being left without them. Nomophobia [18, 19] is a term used to describe the anxiety disorder of fear of separation from mobile phones. In addition to nomophobia, phubbing, which indicates that the interlocutor is being neglected during the conversation due to the use of a smartphone, is increasingly being noticed.

Internet and social network users are sometimes aware that they spend too much time on social networks. The authors [20] of the research concluded that there is a strong connection between respondents who believe they spend too much time on social networks and their desire to stop doing so. A similar association was also found between being told by others that they spend too much time on social media and their beliefs about it. In total, 40 % of respondents underwent digital detoxification.

With digital detoxification, it is possible to engage in many other activities such as sports, meditation, reading, walking, socializing with peers, etc. For example [21] one of the techniques that can be used to reduce nomophobia is a technique called mindfulness. The results of their research showed that mindfulness has a positive effect on preventing nomophobia, the use of technology while driving, and dangerous driving behaviors that can lead to crashes. Furthermore, authors [22] recommend yoga and state that the problematic use of mobile phones really has an impact on physical and psycho-social health and can be considered as a basis for psycho-social disorders, and they believe that by practicing yoga, meditation techniques and breathing technique contributes to a healthy lifestyle, emotional stability and awareness. Thirty minutes of vigorous aerobic activity per day [23] can induce positive changes in students who are addicted to smartphones.

Excessive use of smartphones also affects other health segments, and one of them is precisely the problem with sleep, insufficient amount of sleep, sleep interruptions during the night, fatigue during the second day, etc. The hormone melatonin is responsible for the sleep cycle. Melatonin is synthesized [24] from tryptophan through serotonin and that the key enzyme in this process is called N-acetyl-transferase, which is activated at night, and mostly between 2 and 4 in the morning. Namely, the young often go to sleep with their mobile phones, the devices are often found in the immediate vicinity of the person (on the bed, next to the pillow, on the bedside table, etc.), and the question arises whether they have an impact on the quality of sleep, whether notifications wake them up during the night, whether they browse content on the Internet during the night, whether they fall asleep with some content on social networks in their mind, etc. A very high percentage of respondents (78%) in the Setta region of Morocco suffer from poor and insufficient sleep, especially those respondents who use a mobile phone right before going to sleep [25].

In a study [26] conducted among a population of 626 medical students in India, a total of more than half of the respondents (51.6 %) stated that they keep their mobile phones close to them while sleeping and 84.3 % of the respondents stated that they access social networks via mobile phone.

In a study [27] conducted on 123 medical students at the University Center located in the city of Maceió, state of Alagoas, Northeastern Brazil on their perception of sleep quality and academic achievements and the presence of symptoms related to circadian rhythm disorders before the pandemic and during the period in which the respondents participated in distance learning, such as sleepiness, sleep delay and reduced alertness. The obtained results showed that 100 % of respondents used screens continuously before going to sleep, 77.2 % stated that they had "bad" or "very poor" academic performance, which can be connected to the fact that 65.9 % of respondents could not maintain their productivity due to sleepiness during the day.

A study [28] conducted on a sample of 323 students at a public university in Sabah showed a significant relationship between sleep quality and academic success. The research results showed that the poorer the quality of sleep, the lower the academic success.

Considering the mentioned research results of the authors who researched the impact of mobile phones on students, the results of students studying in the Republic of Croatia on the use of smartphones will be presented in the practical part of the work.

METHODOLOGY

RESEARCH AIM

This research aimed to examine the attitudes and reflections of graduate and undergradute students studying in the Republic of Croatia regarding the use of smartphones during the day and night, its impact on the quality of sleep, and the use of social networks and communication tools.

MEASURING INSTRUMENT

The research used a measuring instrument designed for the needs of this research. The survey questionnaire was designed by the researchers. The questionnaire was not validated because it was a pilot study. After designing the survey questionnaire, it was submitted to the ethics committee of Juraj Dobrila University in Pula, where it was approved for implementation on February 2, 2022. The questionnaire consisted of a total of 23 variables, three of which were open-ended variables. For the purposes of this paper, a total of eleven variables were used. It consisted of two independent (gender and year of study) and the following nine dependent variables:

V_1: On average, how much do you use a smartphone per day?
V_2: Which social network do you most often visit using your smartphone?
V_3: Which tool do you use most often when communicating using a smartphone?
V_4: I use my smartphone right before going to sleep.
V_5: I turn off my smartphone at night.
V_6: The smartphone is in my immediate vicinity during the night.
V_7: Content that I access through my smartphone (for example YouTube and other social networks) helps me fall asleep.
V_8: Notifications on my smartphone wake me up during the night.
V_9: I use my smartphone too much.

The first three dependent variables were asked to the research participants in the form of questions, and they opted for one of the offered answers. The remaining six dependent variables are based on a Likert-type rating scale, where each statement is accompanied by a response scale (1 – never, 2 – rarely, 3 – sometimes, 4 – often, and 5 – very often) and the research participants choose one of the answers offered.

The research was conducted during the year 2022 through an online anonymous survey questionnaire placed on a Google form. The survey questionnaire was distributed via public e-mail lists. The questionnaire was available from February 2, 2022 to May 4, 2022. Respondents started filling out the questionnaire on February 2m 2022 at 18:24:25. In February, a total of 20.5 % of respondents answered the questionnaire, in March 74.01 %, in April 2.44 % and in May 3.05 % of respondents.

SAMPLE

The research was conducted on a sample of 327 respondents, undergraduate and graduate students studying in Croatia. A total of 69.1 % of full-time study respondents and 30.9 % of part-time study respondents participated in the survey.

The questionnaire did not ask about the age of the respondents because the aim was to determine their year of study. Students studying at universities and colleges in Croatia participated in the research. Given that it was an open-ended type of question where the respondents indicated the faculty and the place of study, the faculty was not clearly defined from some respondents' answers, because some respondents entered only the place of study or the university, and some did not answer that question at all. The research participants were informed about the aim and purpose of the research, they were given written instructions on how to fill out the questionnaire, anonymity was guaranteed, the possibility of giving up further answering, and it was explained to them that the data obtained from this research will be used exclusively for scientific purposes.

There were 23 (7 %) male and 304 (93 %) female respondents in the sample. The characteristics of the sample with regard to the year of study are shown in the Table 1.

In order to determine whether there are statistically significant differences in the distribution (normality) of the responses of research participants with regard to gender and year of study, the Kolmogorov-Smirnov test was applied, Table 2.

Table 1. Year of study of the research participants.

Year of study	Frequency	Percentage
First year	54	16.5
Second year	45	13.8
Third year	109	33.3
Fourth year	56	17.1
Fifth year	63	19.3
Total	327	100.0

Table 2. Tests of Normality. Lilliefors significance correction was applied within the Kolmogorov-Smirnov test.

Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
V_1	0,219	327	0,000	0,891	327	0,000
V_4	0,380	327	0,000	0,682	327	0,000
V_5	0,335	327	0,000	0,696	327	0,000
V_6	0,359	327	0,000	0,682	327	0,000
V_7	0,200	327	0,000	0,847	327	0,000
V_8	0,409	327	0,000	0,607	327	0,000
V_9	0,266	327	0,000	0,823	327	0,000

Table 2 shows the results of testing the normality of the distribution of dependent variables. The Kolmogorov-Smirnov normality test was applied. The normality of the data distribution is shown to be statistically insignificant, that is, as a random deviation from normality, if the reliability value is greater than 0.05. As in our case the reliability values for all dependent variables amount to $p = 0.000$ and are less than 0.05, Sig. $= 0.000 < 0.05$, it is concluded that the assumption about the normality of the distribution of the obtained data is not confirmed and it is therefore rejected as such (which is quite common for large samples).

Table 3 shows the values of arithmetic means, standard deviations and skewness of all nine dependent variables. It is observed that the values of skewness for three dependent variables are negative (two of them are greater than one by modulus), which means that most of the obtained results are located to the right of the arithmetic means, among the higher values.

It can be seen from Table 3 that the skewness values for six dependent variables are positive (two of them greater than one), which means that most of the obtained results are to the left of the arithmetic means, among the smaller values.

Table 3. Measure of skewness.

Variable	Mean		Std. Deviation	Skewness	
	Statistic	Std. Error	Statistic	Statistic	Std. Error
V_1	3.16	0.054	0.972	0.242	0.135
V_2	2.24	0.092	1.659	0.994	0.135
V_3	2.47	0.064	1.153	2.431	0.135
V_4	4.43	0.048	0.872	–1.396	0.135
V_5	1.96	0.077	1.395	1.244	0.135
V_6	4.39	0.052	0.946	–1.699	0.135
V_7	2.57	0.081	1.472	0.413	0.135
V_8	1.47	0.047	0.853	2.097	0.135
V_9	3.98	0.059	1.059	–0.602	0.135
Valid *N* (listwise)	327		327	327	

RESULTS AND DISCUSSION

Processing of the data obtained from the research was done using the statistical package IBM SPSS Statistics 21.

The first item that the research participants answered to was related to the average time of daily use of a smartphone. The obtained data and calculated statistical values are shown in Table 4.

Table 4 shows that the largest number of research participants, 38.2 % of them, use their smartphone on average between three and eight hours a day. Comparing the expected ($f_t = 65.4$) and the observed values (frequencies), a very significant difference was found between them. Namely, the chi-square value is very high, it is $\chi^2 = 134.697$ and it is statistically significant ($p = 0.000 < 0.05$). Such a high chi-square points to the conclusion that the responses of the research participants are statistically significantly differently distributed. The next item that the research participants answered to was related to visiting social networks using a smartphone. The obtained data are presented in Figure 1, while the calculated statistical indicators are in Table 5.

Figure 1 shows that the largest number of research participants visit the social network Instagram: 54.1 % of them, followed by the social network Facebook with 16.5 %, while the smallest number of respondents visit the social network Snapchat: 1.5 % of them.

Table 4. Data and statistical values for the dependent variable V_1.

Duration	Less than 1 h	1-3 h	3-5 h	5-7 h	More than 7 h	Total
Frequency	5	84	125	80	33	327
Percentage, %	1.5	25.7	38.2	24.5	10.1	100.0
Mean	3.16					–
Std. Deviation	0.972					–
Variance	0.944					–
χ^2	134.697*					
df	4					–
Asymp. Sig.	0,000					

*0 cells have expected frequencies less than 5. The minimum expected cell frequency is 65.4.
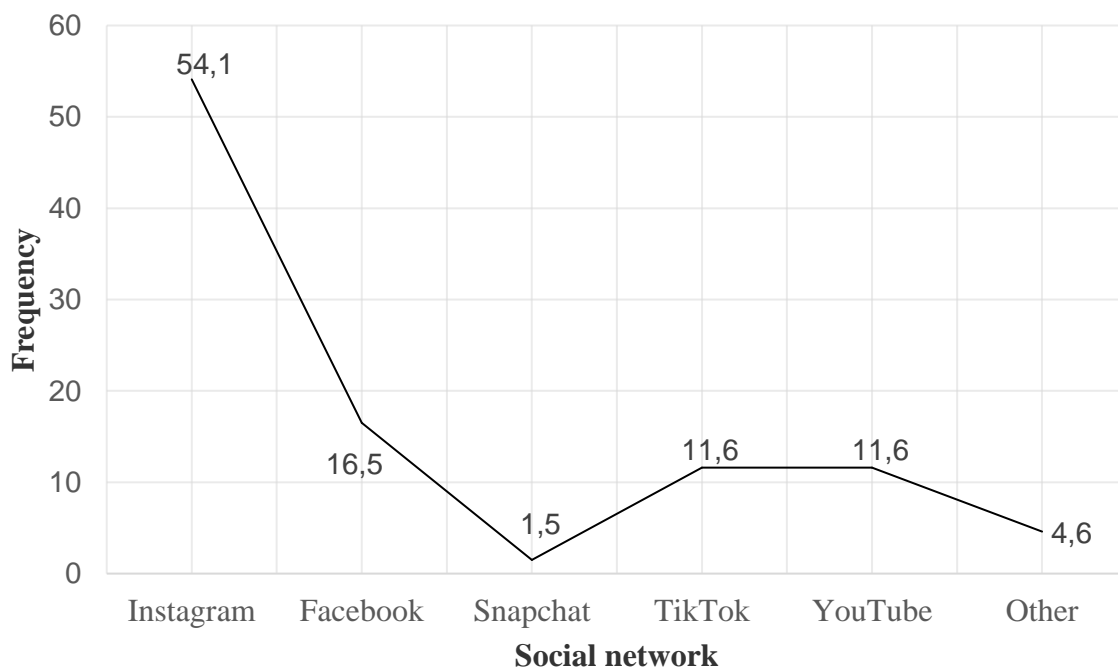

Figure 1. Graphic representation of data obtained with the dependent variable V_2.

Table 5. Data and statistical values for the dependent variable V_2.

Social Media Platform	Frequency	Percentage	Mean	Standard Deviation	Variance	χ^2 df Asymp. Sig.
Instagram – 1	177	54.1				
Facebook – 2	54	16.5				
Snapchat – 3	5	1.5	2.24	1.659	2.753	358.927* 5 0.000
TikTok – 4	38	11.6				
YouTube – 5	38	11.6				
Other – 6	15	4.6				
Total	327	100.0	–	–	–	–

*0 cells have expected frequencies less than 5. The minimum expected cell frequency is 54,5.

Table 5 shows the results of respondents about the social network they use the most. In the questionnaire, social networks are written in random order. Furthermore, Table 5 shows that the arithmetic mean for the dependent variable V_2 is $M = 2.24$, the standard deviation $SD = 1.659$, while the variance value is $V = 2.753$.

Regarding the dependent variable V_3, the research participants were asked to indicate how they communicate when using a smartphone. It was possible to opt for one of the offered methods: e-mail, WhatsApp, Viber, Zoom, Telegram or something else. More than 3/4 of respondents (of them: 75.8 %) use WhatsApp when communicating with a smartphone; only one respondent (in the percentage 3 %) uses Telegram. 8.6 % of research participants use some other form of communication. The following statistical values were obtained for this dependent variable: Mean $M = 2.47$, standard deviation $SD = 1.153$.

This was followed by a set of six dependent variables (from V_4 to V_9) that were given to the research participants to express their opinion on. The obtained data and calculated value statistics are presented in Table 6.

Table 6 shows that the highest arithmetic mean is associated with the dependent variable V_4 $M = 4.43$, which means that before going to sleep, a smartphone is used (V_4) by 84.1 % respondents: often 20.5% or very often 63.6% of them. The smallest arithmetic mean has the variable V_8.

Table 6. Obtained data and statistical values with dependent variables $V_4, \ldots, V_9$ (1 – never, 2 – rarely, 3 – sometimes, 4 – often, and 5 – very often).

Statement	Never		Rarely		Some-times		Often		Very often		Statistical values			
	f	%	f	%	f	%	f	%	f	%	M	SD	V	χ^2 df / Asymp. Sig.
V_4	0	0.0	16	4.9	36	11.0	67	20.5	208	63.6	4.43	0.872	0.761	276.119* 3 / 0.000
V_5	190	58.1	56	17.1	23	7.0	20	6.1	38	11.6	1.96	1.395	1.946	309.223 4 / 0.000
V_6	7	2.1	11	3.4	32	9.8	75	22.9	202	61.8	4.39	0.946	0.895	401.180 4 / 0.000
V_7	112	34.3	66	20.3	50	15.3	48	14.7	51	15.6	2.57	1.472	2.166	44.636 4 / 0.000
V_8	229	70.0	61	18.7	24	7.3	8	2.4	5	1.5	1.47	0.853	0.728	541.914 4 / 0.000
V_9	3	0.9	29	8.9	81	24.8	72	22.0	142	43.4	3.98	1.059	1.122	173.902 4 / 0.000

$M = 1.47$ which means that almost 89 % of research participants claim that their smartphone never wakes them up during the night (70.0 %), or that it rarely wakes them up (18.7 %).

Furthermore, from Table 6, we observe that all chi-square values are very high and range from $\chi^2 = 44.636$ (for the variable V_8) do $\chi^2 = 541.914$ (for the variable V_8). Chi-squares indicate that the respondent's responses, by all dependent variables, from V_4 to V_9, are distributed statistically significantly differently. The skewness characteristics of each of the dependent variables are presented in Table 7. It can be noted that four skewness values are positive and two values are negative. With positive skewness values, most of the obtained results are to the left of the arithmetic mean, among the smaller values, while the results of negative asymmetries are located to the right of the arithmetic mean, i.e. among the larger values.

Table 7. The skewness of data obtained by the research for the variables $V_4, \ldots, V_9$.

		Dependent variable					
		V_4	V_5	V_6	V_7	V_8	V_9
N	**Valid**	327	327	327	327	327	327
	Missing	0	0	0	0	0	0
Skewness		0.994	2.431	−1.396	1.244	−1.699	0.413
Std. Error of Skewness		0.135	0.135	0.135	0.135	0.135	0.135

The correlation values of the dependent variables V_4 to V_9 are presented in Table 8. It can be seen that six correlations are significant at the .01 level, and three of them have a negative sign. The highest correlation is between the variable V_6: The smartphone is in my immediate vicinity during the night and the variable V_8: Notifications on my smartphone wake me up during the night; it is a moderate correlation, an essential connection. The value of only one correlation is at the 5 % significance level and it has a negative sign. Other correlation values are not statistically significant.

Table 8. Correlation of dependent variables $V_4, \ldots, V_9$.

		V_4	V_5	V_6	V_7	V_8	V_9
V_4	**Pearson Correlation**	1					
	Sig. (2-tailed)						
	N	327					
V_5	**Pearson Correlation**	–0,026	1				
	Sig. (2-tailed)	0,645					
	N	327	327				
V_6	**Pearson Correlation**	–0,156**	–0,080	1			
	Sig. (2-tailed)	0,005	0,147				
	N	327	327	327			
V_7	**Pearson Correlation**	0,074	0,010	–0,145**	1		
	Sig. (2-tailed)	0,180	0,859	0,009			
	N	327	327	327	327		
V_8	**Pearson Correlation**	–0,208**	0,067	0,445**	–0,111*	1	
	Sig. (2-tailed)	0,000	0,227	0,000	0,044		
	N	327	327	327	327	327	
V_9	**Pearson Correlation**	0,002	0,055	0,373**	–0,020	0,237**	1
	Sig. (2-tailed)	0,975	0,323	0,000	0,715	0,000	
	N	327	327	327	327	327	327

*significant at the 0.05 level (2-tailed)
**significant at the 0.01 level (2-tailed)

The conducted research has shown that all respondents use a mobile phone. On average, most respondents use it for three to five hours a day (38.2 %). The obtained information that a total of 10.1 % use it for more than seven hours is worrying. The smartphone has become ubiquitous in the everyday life of students. Frequent use of smartphones can affect the student's mental health and cause addiction to smartphones [29-30], the feeling of boredom and loneliness can cause aggression and addiction [31-32].

Considering the great popularity of social networks and tools for communication, students in this study most often visit the social network Instagram (54.1 %) and Facebook (16.5 %) and WhatsApp (75.8 %) as a tool for communication. Implications for some future research are to investigate how much time they spend on social networks and for what purposes and the possible impact (also) on their mental health.

Furthermore, in the research we were interested in how many respondents use their smartphone before going to sleep and whether the smartphone wakes them up during the night. The obtained data showed that 84.1 % of respondents do this, which could have negative implications for quality sleep, waking up during the night, lack of secretion of the very important hormone melatonin, and fatigue during the next day. Furthermore, a total of 89 % of respondents are not woken up by their smartphone during the night, but the data obtained that 7.3 % are woken up occasionally and 1.5 % very often is worrying. The authors [33-34] who studied the use of smartphones at night and their impact on insomnia concluded that they have negative health implications that can include daytime sleepiness, insomnia, poorer academic achievements and other unwanted consequences. In the research, the greatest connection was determined between the variable V6 (During the night, the smartphone is in my immediate vicinity), and the variable V8 (Notifications on my smartphone wake me up during the night).

CONCLUSIONS

The research shows the influence of smartphones on a sample of a total of graduate and undergraduate 327 students studying at one of the Universities and/or Polytechnics in the Republic of Croatia. We were interested in how much time students use a smartphone on average per day, which social network and communication tool they use the most, and whether they use their smartphone before going to sleep, whether they are woken up by sounds on their smartphone during the night, and whether they think they use their smartphone too much. Considering the many authors [35-37] who have researched the impact of smartphones on students' health, smartphone addiction [38], sleep-related problems [39-41] and the general impact on a person's mental health [42, 43], these studies have shown that excessive use of smartphones is generally not good for health.

What are all the possible reasons for excessive use of the smartphone, visiting social networks; is it boredom, the need to be on trend with the latest information, the number of likes, being seen, popularity, addiction to information, addiction to social networks, addiction to the phone and the inability to access information "immediately, at the moment and on demand" and the like are topics that have been studied and that open up new knowledge and new research of a multidisciplinary character and that require a "holistic" approach.

Lifelong multidisciplinary education about possible health consequences due to excessive use of smartphones is necessary at all levels of the educational process, and it would be wise to conduct it at least once a year.

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