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Learning through Digital Devices—Academic Risks and Responsibilities

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Abstract: The purpose of this study is to examine the risks of learning through digital technology and to design the individual and academic responsibilities. We propose answering the following research questions: Are higher education students and their families equipped with digital devices? What strategy do students use in their individual learning? How frequently do they get involved in various added digital activities (gaming, social media communication, surfing the Internet)? What are the risks of excess time spent online? A total of 2210 higher education students from five European countries, Romania, Slovakia, Hungary, Serbia, and Ukraine, participated in the quantitative study, the data being collected by the Center of Higher Education Research and Development at the University of Debrecen, Hungary in 2019. The analysis of the data is based on the advanced statistical test carried out with the SPSS program. The results indicated that most students come from families that possess essential digital devices (smartphone, PC, notebook) with an internet connection, regardless of the country of origin. The students' learning strategy is mixed: they use the virtual and real environment. More than half of the students declared that they never learn by watching tutorials or listening to audio recordings. Reflecting on themselves, more than a third of them stated that they generally spend too much time online. Daily surfing, gaming, and communicating on social networks are those added activities that significantly multiply their chance of spending too much time in a virtual environment. The binary logistic regression analysis proves that these students have a four times greater chance of developing a concentration crisis. In addition, it is characteristic for there to be a general time management crisis that implicitly contributes to the development of a deadline crisis in learning, and another risk is the duplication of intention to drop out of university.

Keywords: higher education students; academic learning; online time; risks

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1. Introduction

This explanatory study makes a diagnosis in a group of students in higher education who have learned in five European countries: Romania, Hungary, Slovakia, Serbia, and Ukraine. We examined their equipment, individual learning, and added activities through digital devices.

The presence of technology in the teaching-learning process is not a new phenomenon because laboratories, schools, or university workshops have existed for centuries. The seminar (laboratory) classes are an integral part of the curriculum and are aimed at making the connection between theoretical knowledge and its applicability and practical functionality, as well as practicing students in this demonstrative, innovative environment. Computer-assisted training is a didactic–learning method that capitalizes on the principles of modeling and cybernetic analysis of the training activity in the context of new information and communication technologies, characteristic of the post-industrial society. The process of the informatization of training reflects the huge progress made at the level of a cultural model that is gradually affirmed, on a social scale, through the development of

information and communication technologies and the application of these technologies at the level of information services present in all spheres of human activity. The social trend of a massive endowment of people, the digitalization of modern formal learning, and the promotion of computer-assisted training as a new form of learning are being researched to establish their advantages and limits [1,2].

Several national and international social–political trends that focus on this topic have pointed out the economic, administrative, and social approaches of digitalization having a general, utilitarian prism of using technology, neglecting the individual dimension. One of the foundations of modern education in schools and universities is the principle of relevance. This refers to a requirement that education simultaneously responds to the personal development needs of beneficiaries and, at the same time, also adapts to social and economic needs. A question that arises, however, is how will the individual, human dimension function on the prism of the social and political goal of lifelong learning? Making a diagnosis to determine the needs of pupils and students focusing on learning through digital devices, establishing the existing individual and educational risks, is a requirement of the current society of the 21st century, centered on the education of the beneficiary [3–5].

In our era, the digital journey of the young generation starts during their socialization in their families in early childhood, and continues as students in schools and universities. Many parents provide digital technologies for education and learning purposes, and schools and universities use digital instruments in teaching. Students learning through these modern instruments is a new phenomenon, and many studies present the gaps in knowing the risks and the lack of critical thinking. The time spent online and the impact of digitalization on the young generation's development is a conflicted theme in the scientific articles. The literature exploring the lifestyle on digital use emphasizes a challenge for researchers, teachers, parents, and also youth, to determine where the limit is between the healthy and harmful use of the digital instruments and how much daily time spent online is too much [6–11].

Traditional learning is replaced by hybrid learning, which combines two learning environments: face-to-face and virtual. Their integration is a challenge for all actors involved in the learning process. The adaptation of the person to two environments, also synchronous and asynchronous, and the efficient management of time in both the real and the virtual environment is possible only by developing the skills and competencies necessary for this way of learning. Time and other personal resources management are to be learned. Connecting people and households to the Internet and equipping them with digital devices is a modern social goal, but the development of perception toward being reflexive, logical, and responsible for their activities is a condition of lifelong learning [12].

Lifelong learning means daily or weekly regularly learning and the continuous ability development of personal reflection and time management. "Personal, social and learning to learn competence is the ability to reflect upon oneself, effectively manage time and information, constructively work with others, remain resilient and manage one's own learning and career. It includes the ability to cope with uncertainty and complexity, learn to learn, support one's physical and emotional well-being, maintain physical and mental health, and to be able to lead a health-conscious, future-oriented life, empathize and manage conflict in an inclusive and supportive context." [13].

The first critical point of learning through technology is the inequality in equipping students with modern digital devices. Another critical point of the modern process is the individualization of modern learning. Digital technology allows for a high degree of individualization of formal learning, where students form their own rhythm of learning and particular strategies, but, at the same time, the danger of psychosocial isolation arises. Another critical point concerns the ever-changing web context. The online learning environment does not provide stability in time for young people but facilitates the continuous search for novelties [14–16]. In light of this, a question arises: how does the use of informal searching and other added virtual activities (gaming and communication on social platforms) affect students' individual learning time and concentration ability?

At the level of European countries, the general endowment of households with the Internet shows inequalities. The population of the countries in the former Soviet bloc with Internet access experienced exponential growth after the political changes of 1989 (Figure 1). In 2019, in Slovakia and Hungary, over 80% of the population was considered as individual Internet users, and, in Romania, over 70% [17].

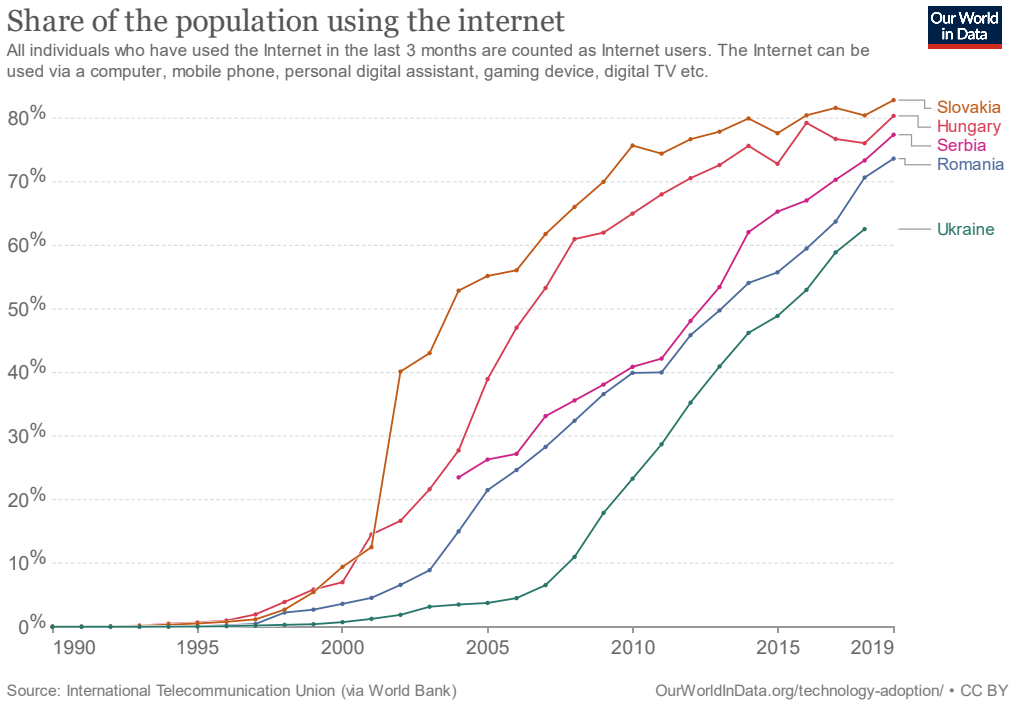

Figure 1. The percentage of the total population with access to the Internet. Source: https://ourworldindata.org/internet#internet-access, accessed on 15 April 2022.

This inequality is particularly evident in the assessment of digital skills. At the European policy level, the European Commission's Communication on the Digital Education Action Plan defines digital competence as "the confident, critical and responsible use of digital technologies, as well as their use for learning, in the workplace and for participation in society." [13]. Although such a large percentage of the population of European countries has been connected to the Internet in the last 30 years, through various digital devices, the group of people aged 16–74 who have basic digital skills was much narrower in 2021. In the EU countries targeted in this study, Slovakia, Hungary, and Romania, the biggest gap is in Romania. Out of the total population, over 70% use the Internet individually, but the percentage of those who have at least basic digital skills is below 30%. This gap is smaller for the young generation in Romania, aged between 16 and 24: approximately 50% of them have basic digital skills, but young people of the same age in Slovakia and Hungary are around 70% [18,19].

Following the analysis of these international statistics, it can be concluded that it is not enough to just increase the number of people with access to the Internet through various digital devices. Real inequalities can be reduced by educating these people and especially the younger generation in the confident, critical, and responsible use of digital technologies, as well as their use for learning, in the workplace, and participation in society.

2. Materials and Methods

The Center for Higher Educational Research and Development from the University of Debrecen, Hungary, CHERD–H (https://cherd.unideb.hu/en, accessed on 12 December 2019), based on contract No. 1908/23 November 2018, led international quantitative research, named PERSIST (http://www.persist.unideb.hu/en/palyazatrol, accessed on 12

December 2019), on the topic of university dropout. The questionnaire had items referring to the digital devices' dotation, virtual learning strategies, added online activities, and dropping out reasons (learning, concentration, and time management crisis). Students from different European universities completed this complex questionnaire. In 2019, the database was finalized and led to statistical analysis of the data. The database was completed by 2210 students from five European countries (Table 1). The partner university institutions that participated in this study were the following:

- From Romania: the Babeș–Bolyai University with 163 students, the Emanuel Univesity from Oradea with 112 students, the University of Oradea with 173 students, Sapientia Hungarian University of Transilvania with 135 students, the Partium Christian University from Oradea with 156 students.
- From Slovakia: the Selye János University (SK) with 98 students, Constantine the Philosopher University in Nitra with 31 students.
- From Hungary: the University of Debrecen with 805 students, the Debrecen Reformed Theological University with 100 students, the College of Nyíregyháza with 113 students, St. Athanasius Greek Catholic Theological Institute with 27 students.
- From Serbia: (SB) the University of Novi Sad 97 students.
- From Ukraine: the Ferenc Rákóczi II Transcarpathian Hungarian Institute with 105 students, the Mukachevo State University with 10 students, Uzhhorod National University with 74 students.

Table 1. Countries included in the study and the number of higher education students (N). (Source: PERSIST 2019).

Country	N
Romania	739
Hungary	1045
Slovakia	129
Ukraine	189
Serbia	97
Missing data	11
Total	2210

In this study, the answers to the following research questions were looked for: Are students and their families equipped with digital devices? What strategy do students use in their individual learning? How frequently do they get involved in various added digital activities (gaming, social media communication, surfing)? What are the risks of excess time spent online?

3. Results

This section is divided into five dimensions: at first, we will present the student sample and the demographic and academic characteristics of them. Secondly, the family background on digital equipment dotation and the subjective material situation of the students are presented. After that, we examine the individual learning strategy and student's reflection on time spent online. We will finish the presentation of the results connecting the excess time spending on the virtual environment and the risk of academic learning crisis.

3.1. Demographic and Academic Characteristics of the Student Sample

In this study, participants were 1494 females and 638 males, with an average age of 23 years. Most of them (83%) were in their second- or third-year bachelor's degree (B.A.), and the rest of the students were in their master's degree (M.A.), in the academic year

2018–2019. The following Table 2 presents the student sample by their academic field of study. The 20,210 respondents came from a broad spectrum of specializations: teacher education, arts, economic, medical, social and natural sciences, technical, IT, agricultural, law, and theology domains.

Table 2. Students' specialization fields (N = 2210). (Source: PERSIST 2019).

Country	N
Teacher education	489
Arts	324
Economic	282
Medical	202
Social sciences	186
Natural sciences	140
Engineers	126
Agricultural	116
Informatics	115
Art	75
Law	63
Theology	55
Other	37
Total	2210

3.2. The Family Background of Students and the Digital Equipment of Them

A total of 28% lived in large cities (municipalities), 34% in small towns, and 38% in rural areas by the age of 14. Almost half of the students (49%) grew up in a family with two children, 21% have two more brothers or sisters, 11% grew up in a large family with four or more children, and 19% have no brothers or sisters. Their mother's educational level was 26% primary, 41% secondary, 32% higher education, and 1% never met their mother. Their father's educational level was 34% primary, 37% secondary, 27% higher education, and 2% never met their father. Most families (56%) had an approximately average material situation compared to the family peers. A total of 35% declared that their family is in a better or much better situation than their peers, and 9% were below the average level, according to the subjective perception of the students. A total of 10% of the students perceived negative changes regarding the material situation of the family during their academic studies.

In the next figures, it is noticed that most of the families of origin had in their possession a smartphone, mobile phone, personal computer (PC), or notebook, with access to the Internet. Moreover, more than half of the students had a tablet or e-book reader (Figure 2).

It can be stated that the families of students' essential digital equipment (smartphone, PC, notebook) were generally good, with access to the Internet (Figure 2). Most students came from families that own essential digital devices, regardless of their country of origin. Only a small percentage (3%) were deprived of these goods. These results show a higher dotation of the families compared with their countries' average [17].

Examining the individual material situation, a third of students (31%) declared that they have everything that they want and can spend significant sums, such as trips abroad or buying expensive things. The majority (62%) had everything that is necessary but could not afford large expenses. A minority group (7%) of the students (a total of 143) often experienced a lack of money for their daily needs. The relative digital equipment dotation shows that 56% of students could not afford a smartphone that was more expensive than others, 59% did not have a more expensive PC or notebook than others, and 70% did not own tablets or e-book readers. It is important to underline that, at the individual level of

the total sample, 626 students possessed tablets or e-book readers, according to the country of origin: 335 from HU, 142 from RO, 48 from SK, 53 from the UA, 14 from SB. According to their material situation, most of them could buy, but the results indicate that these digital devices were not among the preferences of students.

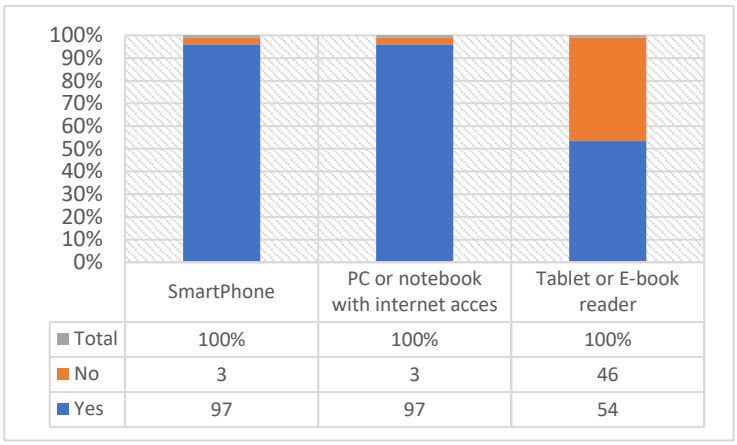

Figure 2. Digital devices in the student's family (N = 2210) (%). (Source: PERSIST 2019).

3.3. Individual Academic Learning Strategies and the Use of Digital Technology

Examining students' learning strategies, we considered the next question: How frequently do you read bibliographies specific to your field of specialization (in traditional mode, reading books or through technology)? Approximately two-thirds of students (64%) regularly read specific literature (9% of students read daily, a quarter read weekly, and 29% monthly). At the same time, it is important to note that a third of students do not read bibliographies at all, or very rarely. In addition, there are many strategies for individual learning. The literature review suggested the mixed mode, which is the combination of the classic (make notes, figure, highlight important information, read the material loudly or silently) with the digital one (read slide show, watch videos, listen to audio recordings). Figure 3 presents the frequency (daily, weekly, monthly, rarely, or never) of students who preferred individual learning strategies in real and virtual environments.

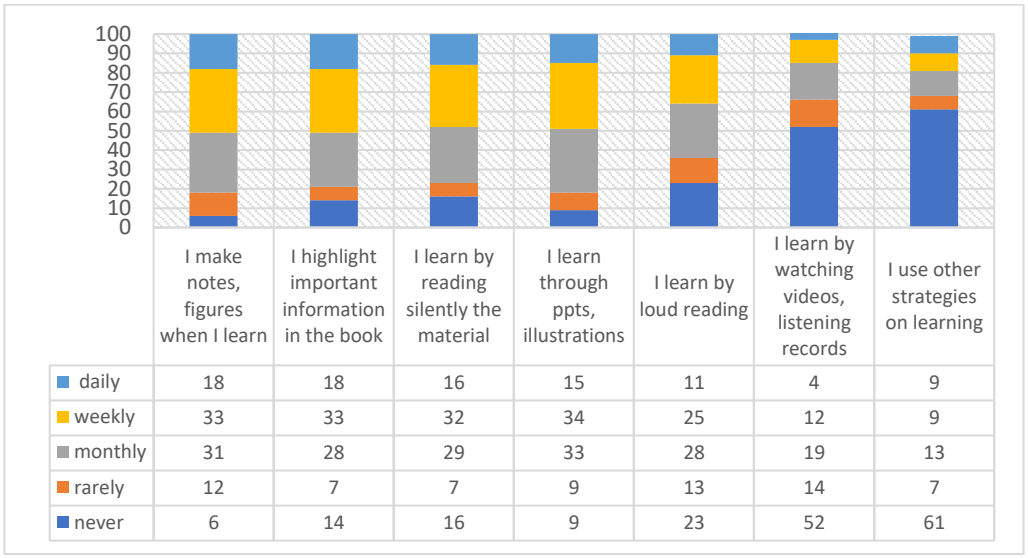

Figure 3. What strategy do students have in the process of individual preparation and academic learning? (N = 2210) (%). (Source: PERSIST 2019).

Next, factorial analysis was performed on the main components based on five variables of the learning strategies. Three factors were extracted as a result of the orthogonal rotation of the factors, thus determining the factorial structure in Table 3, which represents 75% of the initial variance (the first factor 28%, the second 27%, the third 20%). The latent structure was connected to both the real and virtual environment: they mark information, read the material, listen to audio recordings, or watch tutorials. The following pattern emerged in Table 3: learning by marking, learning by reading, and learning by listening or watching.

Table 3. Structure analysis of learning strategies. (Source: PERSIST 2019).

	Learning by Marking	Learning by Reading	Learning by Listening or Watching
I make notes and figures	0.840		
I emphasize important information in the book	0.789		
I read silently the materials		0.877	
I learn through slide show, illustrations		0.717	
I watch tutorials or listen to audio recordings			0.980

3.4. Reflection on Added Digital Activities and the Time Spent on Virtual Environment

Several studies have been conducted researching added digital activities of the people and the risk generated [20–24]. We continue with the premise that students are usually involved in actions in the virtual environment, in addition to their academic learning duties: they communicate on social networks, surf the Internet, play games, and listen to music. The proportion of students with digital implications is included in Table 4: their more preferred daily activity is the communication on the social networks and they less prefer to listen to music when they learn.

Table 4. The frequencies of added digital activities of the students (N = 2210) (%). (Source: PERSIST 2019).

	Never	Rarely	Monthly	Weekly	Daily
I communicate with others on social networks	2	5	3	18	73
I surf the Internet or play games	10	12	5	29	45
I listen to music when I learn	40	9	18	20	14

The added digital activities (the communication on social networks, surf the Internet, or play games) increase the time that youths spend in an online environment [25–27]. More than a third of 2210 students declared ”all the time” or ”mostly yes” regarding whether they spend too much time online (Figure 4). The variable “I spend too much time online” was converted to a variable dichotomy: 0—no (never, mostly not), 1—often (all the time, mostly yes).

How do students spend their excess virtual time? Does time spent online mean learning (to read special bibliographies, slide show, illustrations, watch tutorials, listen to audio recordings) or include communication on social networks and carrying out other digital activities (gaming, surfing)? The Chi-square test analyzes the association between student’s excess time spent online and different virtual activities. The variable “I spend too much time online” was converted to a variable dichotomy: 0—no, 1—often. There is no significant association between the excess time spent online and the specific learning activities (Table 5). The significant association appears due to communication on social networks (p = 0.000), and surfing and playing games on the Internet (p = 0.000). These added activities significantly multiply the student’s time spent in the virtual environment. The time spent online nearly doubled in the student’s group who communicate daily on social networks (OR = 1.8) compared with the group who communicate rarely. The odds of

spending too much time online were double the amount for the higher education students who surf the Internet or play games daily (OR = 2.3).

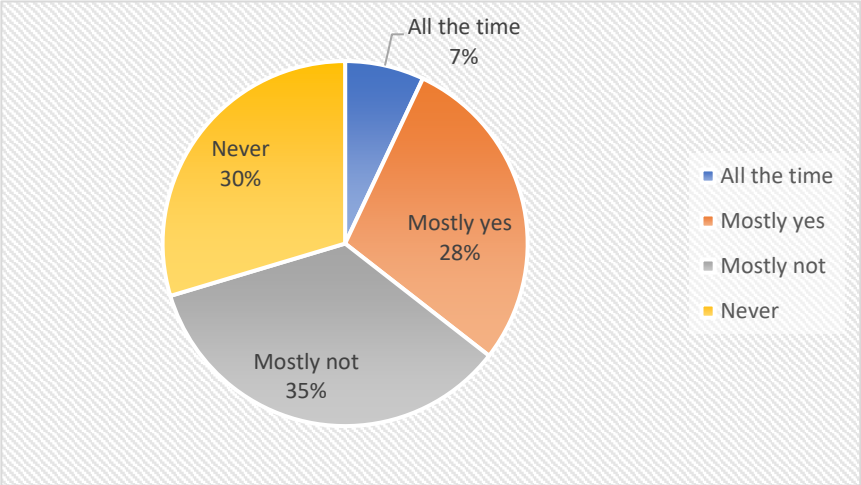

Figure 4. Is it characteristic of you to spend too much time online? (N = 2179) (%). (Source: PERSIST 2019).

Table 5. The association of added digital activities and time spending online (N = 2210) (%). (Source: PERSIST 2019).

I Spend Too Much Time Online	I Communicate on Social Networks		I Surf the Internet or Play Games		I Read Bibliography		I Learn by Slide show and Illustrations		I Watch Tutorials and Listen to Records	
	Daily	Not Daily	Daily	Not Daily	Often	Not Often	Often	Not Often	Often	Not Often
no	917	419	504	836	855	481	725	441	271	1042
often	592	148	425	308	472	271	387	259	150	577
N	2076		2073		2079		1812		2040	
OR	1.8		2.3		1		0.9		1	
Sign.	$p = 0.000$ ***		$p = 0.000$ ***		NS		NS		NS	

*** $p \leq 0.001$, p—level of significance.

3.5. This Self-Reported "Too Much Time Online" Can Lead to a Learning Crisis? The Crisis of Concentration in the Classroom, in Handling Deadlines, and the Danger of Dropout

Concentration and time management factors appear important in students' learning process: concentration in the classroom activities, sufficient time for individual preparation, and managing deadlines. The chi-square statistical test examination reveals the association between self-reported "too much time online" and students' learning problems. As we can see from data in Table 6, students who spend too much time online tend to have higher problems with their own concentration resources and managing time. The odds of concentration and time management crisis significantly multiplied for the students' group who spent too much time online, and their intention to abandon their university studies was nearly doubled.

The variable "I spend too much time online", converted to the variable dichotomy of 0—no, 1—often, was used as an independent variable in binary logistic regression analysis. We also included demographic factors (country of origin, sex, mother and father education level, the number of brothers and sisters, if students own expensive laptop or smartphone). Dependent variables are related to concentration in the lectures or to the situation where there are more interesting things to carry out, and, on the other side, with deadlines and general time crisis. Those who spend too much time online are four times more likely to develop concentration problems in the classroom. If they encounter new things, their chance of losing the ability to concentrate on learning doubles. The "too much time online" variable can generate crises of time and implicitly contributes to the development crises

in the preparation of the written papers for seminars and exams. An expensive laptop can significantly reduce the deadline time crisis of students (p = 0.002, ExpB = 0.6), but not the general time crisis. Thus, the excess time spent online induced general crises of concentration and time (Table 7).

Table 6. The significant association between time spent online and learning crisis. (Source: PERSIST 2019).

I Spend Too Much Time Online	Concentration Crisis in Class		Concentration Crisis in Searching		General Time Crisis		Deadline Time Crisis		Abandon Intention	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Never
no	248	1147	985	406	426	966	1217	161	539	848
often	349	424	407	359	410	355	570	191	401	367
N	2168		2157		2157		2139		2155	
OR	3.8		2.1		2.6		2.5		1.7	
Sign.	p = 0.000 ***		p = 0.000 ***		p = 0.000 ***		p = 0.000 ***		p = 0.000 ***	

*** $p \leq 0.001$, p—level of significance.

Table 7. Too much time online is a predictor of the concentration and time crises. (Source: PERSIST 2019).

Independent Variables	Dependent Variables							
	Concentration Crisis in Class		Concentration Crisis in Searching		General Time Crisis		Deadline Time Crisis	
	Exp (B)	Sig.	Exp (B)	Sig.	Exp (B)	Sig.	Exp (B)	Sig.
I spend too much time online (0—no, 1—yes)	4	p = 0.000 ***	2	p = 0.000 ***	2.6	p = 0.000 ***	2.5	p = 0.000 ***
Brothers and sisters' number (0—many, 1—alone or one)	0.9	NS	0.9	NS	1.0	NS	0.9	NS
Country (0—other, 1—RO)	1	NS	0.7	NS	1.0	NS	0.8	NS
Sex (1—male, 0—female)	1	NS	1	NS	1.0	NS	1.5	p = 0.003 **
Expensive mobile phone (0—no, 1—yes)	0.9	NS	NS	1.2	1.0	NS	1.2	NS
Expensive laptop (0—no, 1—yes)	1	NS	1	NS	0.9	NS	0.6	p = 0.002 **
Mother education level	1.1	NS	0.9	NS	1.1	NS	0.9	NS
Father education level	1	NS	0.8	NS	0.8	NS	1	NS

*** $p \leq 0.001$, ** $p \leq 0.01$, p—level of significance.

Finally, we analyzed if it is possible for added online time to increase the chances of students intending to abandon their studies. The binary logistic regression analysis was conducted to answer this question: the answer was yes (Table 8). Was there a significant correlation (p = 0.000) between the independent variable: I spend too much time online and the dependent variable: Do you think of abandoning your studies? We also included demographic factors (country of origin, sex, mother and father education level, the number of brothers and sisters, if students own expensive laptop or smartphone). Regarding the student group who spends too much time in a virtual environment daily, their chance of abandoning higher education studies nearly doubled (ExpB = 1.7).

Table 8. Too much time online is a predictor of university drop out. (Source: PERSIST 2019).

Independent Variabile	Dependent Variable	
	Do You Think of Abandoning Your Studies?	
	Exp (B)	Sig.
I spend too much time online (0—no, 1—often)	1.7	$p = 0.000$ ***
Brothers and sisters' number (0—many, 1—alone or one)	1	NS
Country (0—other, 1—RO)	0.8	NS
Sex (1—male, 0—female)	1	NS
Expensive mobile phone (0—no, 1—yes)	1	NS
Expensive laptop (0—no, 1—yes)	1	NS
Mother education level	0.9	NS
Father education level	0.8	NS

*** $p \leq 0.001$, p—level of significance.

4. Discussion

In the process of the individual, family, community, and social spread of digital devices, the economic, administrative, and educational utilities are pronounced and the advantages of using these innovations are emphasized [28]. However, European statistical data show that, within the population aged 16–74, the digital skills necessary for lifelong learning, with an educational and professional purpose, have not been developed [19]. Learning to learn and work through these digital devices is a much more complex task than learning to use these innovative devices of the twenty-first century [29]. The results of this study show that 97% of the total of 2210 students who attended university studies in the academic year 2018–2019 in five European countries (Romania, Slovakia, Hungary, Serbia, and Ukraine) had access to the Internet in their family of origin. This is a much higher result compared to the general population of the countries involved in this study (Figure 1). Only 3% of the sample of students were deprived in 2019 of this innovation; they did not have these digital devices in their possession and did not have access to the Internet in their families of origin. When analyzing students' preferences regarding digital devices, 70% of the sample of students did not possess an individual e-book reader or tablets, which is a result that directs us to the next step of the study, in which, we approached their learning strategies. According to the specialized research, following the educational spread of these digital devices, in many educational institutions, they switched to a mixed method of teaching–learning [30]. This method is also confirmed by our results, where the individual learning and academic preparation of students is mixed: they make notes and schemes from the learned subject, mark important information on books, read the subject, and learn through slide show, illustrations, videos, and recordings. The statistical structure analysis has led us to three individual learning strategies: learning by marking, learning by reading, and learning by listening or watching. Of these three strategies, the least preferred is the last; that is, 66% of students never or very rarely watch tutorials or listen to recordings for learning purposes. In their individual learning, they regularly prefer the other strategies: 51% learn by marking, 49% through slide show or illustrations, and 48% learn by silently reading the material. A third of students use these popular methods with a monthly regularity. It is worth mentioning that 18 to 23% of students do not read the educational material regularly (not even monthly) and use these learning strategies very rarely (annually or never). Preparing materials for individual learning purposes, university institutions have the responsibility to know the student's preferences and to offer the possibilities of mixed learning in order to develop their competency in mixed academic learning from the first year of study. It is recommended that specializations elaborate for the first-year students a reference book of the theoretical and practical university training as a learning support in their individual and professional preparation. Equally, it is important for them to learn

to use digital platforms and online resources of the university [31,32]. Students have a responsibility to choose and develop their own academic learning strategies, which they can regularly use in their preparation and individual learning.

In the second part of the study, we focused on the management of own resources—the time and concentration of students—because these are based on learning and working activities. Due to the fact that digital devices are useful not only for learning and working purposes, but also for communication, socialization, and leisure purposes, and since students did not know the danger and the risks, we asked students to reflect on the digital activities that they are involved in and the time spent online, in addition to their academic responsibilities. According to our results, the most preferred digital activity is communicating with other people through social networks. A total of 73% of the total of 2210 students use this digital mode of communication with others on a daily basis. A total of 74% frequently (daily or weekly) use their digital devices for surfing the Internet and gaming. Almost half of them (49%) never or very rarely listen to music during learning. According to the scientific literature [33], these digital leisure activities overlap with the other physical or virtual activities and responsibilities, where people most frequently use multiple tasks in both the real and virtual environment. They simultaneously engage in several tasks and activities. Operating efficiently in and between these two environments, in the long term, requires the development of special skills and competences. Learning by using the physical and virtual environment (or mixed learning), as well as simultaneous involvement in learning and digital leisure activities (communication on social networks, surfing on the Internet), are complex activities whose efficiency is researched, presenting many dilemmas [34,35]. One of these concerns is time management [36–38]. According to our results (Figure 5), the subjective excess time spent in the virtual environment is due to digital leisure activities (communication on social networks, surfing the Internet and gaming) and not due to learning tasks. These added digital activities require added virtual time, and the risk that the student will experience a general time crisis is 2.6 times higher compared to those who do not spend excess time in the virtual environment. In addition, an excess of virtual time has 2.5 times more of a chance of inducing a crisis of academic learning due to failure to keep to the deadlines (timely completion of academic assignments, essays required by the teacher). The chance of dropping out of the academic studies almost doubled for students who spent excess time in the virtual environment.

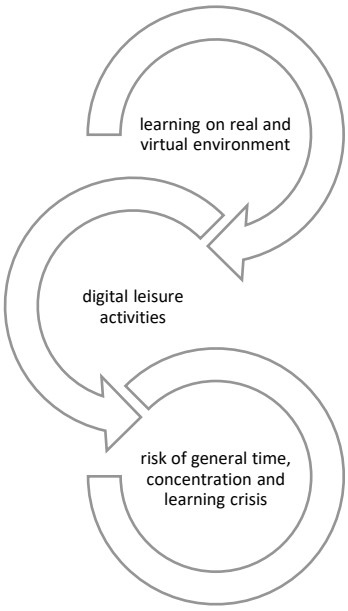

Figure 5. Simultaneous involvement in learning and digital leisure activities risks a learning crisis.

Another dilemma is the management of individual resources, under which, in this study, we understand the capacity of individual concentration, specific to the human brain, as very important in the learning process [39,40]. According to our results, students who spend too much time online have an almost four times higher chance of developing a crisis of concentration, which implicitly negatively influences individual or classroom academic learning (Figure 5).

These results were also supported by our advanced statistical tests, where the variables were controlled by the variables characteristic of the demographic situation.

5. Conclusions

The purpose of this study was to determine if higher education students were equipped with digital devices in 2019, to examine their individual learning strategies, and to design some risks and responsibilities in using this equipment. The study subjects were from five European countries: Romania, Slovakia, Hungary, Serbia, and Ukraine. Students reported their family digital equipment, their individual material situation, and their learning strategies in the real and virtual environment, and reflect on their added digital activities and their time spent online. We found that most of these families were equipped with essential digital devices (smartphone, PC, notebook) and 3–7% of them were deprived of these goods. These students had material risk in academic integration, and the responsibilities of the universities are to support these students in procuring digital devices for learning purposes and to develop digital skills. After analysing individual academic learning strategies and the use of digital technology, we found a latent structure of the learning strategies of students. We conclude that they were connected with the real and virtual environment in their individual preparation. The students' favorite mode of learning is to silently read the material on a traditional (book) or digital format and to mark important information. More than half (52%) of them declared that they never learn by watching videos (tutorials) or listening to records (audio recordings); they mostly prefer the summarized way of learning: watching or reading slide show and illustrations. The academic responsibilities of the universities are to support students' digital socialization in universities. Teachers have to prepare the academic materials on accessible (traditional and digital) formats, in a summarized way, to develop students' competency toward mixed learning. Students have the responsibilities to find the best individual strategies for learning and to practice through academic preparation. On the final part of this paper, we explored the student's subjective time management and concentration capacity. They learn by using the physical and virtual environment with mixed strategies, and, simultaneously, are involved in learning and digital leisure activities (communication on social networks, surfing and gaming daily on the Internet). It was found that the excess of time spent online can induce general crises of concentration and time. The added digital activities require added virtual time, and the risk that the student will experience a general time crisis has a 2.6 times higher chance compared to those who do not spend excess time in the virtual environment. In addition, the excess of virtual time has a 2.5 times greater chance of inducing a crisis of academic learning due to the failure to keep to the deadlines and to concentrate in order to learn, and the intention to abandon the university study was nearly duplicated.

The practical significance of these findings is that students need to be supported in digital socialization in higher education and in their individual academic learning, includ time and resources management in the same way.

The role of universities and teachers is to educate students on individual responsibility, develop critical thinking toward using digital devices, learn to structure time, and support the ability to concentrate in such a way as to avoid learning crises and academic dropout.

The pandemic period has accelerated the digital transformation of universities around the world, creating their own innovative, special experiences, which have a practical significance for the future [41–43].

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