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Article

Factors Influencing the Quality of Distance Learning—Serbian Case

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Abstract

This study examines the key factors influencing the quality of distance learning in higher education during the Covid-19 pandemic, when online learning became the dominant mode of education. Using a descriptive method and a 26-item questionnaire, data were collected from a representative sample of 360 students in Vojvodina, Serbia. The factors analyzed include computer literacy and technology access (Ph1), students' ability to balance life obligations with study demands (Ph2), and their motivation for distance learning (Ph3). The results show that 89% of students had adequate IT access, 47% were able to reconcile study and personal obligations, and 70% reported strong motivation. Correlation analysis confirmed a statistically significant positive relationship between all three factors and students' perceptions of well-organized distance learning, thus supporting the main research hypothesis. Beyond these findings, the study interprets digital literacy as adaptability, time management as resilience, and motivation as values orientation and futures thinking—core dimensions of sustainability competences outlined in the European GreenComp framework. Distance learning is therefore positioned not only as an emergency response but also as a transformative pedagogy that integrates brain (knowledge), hands (skills), heart (values), and spirit (purpose), contributing to sustainable and resilient higher education.

Keywords: distance learning; IT literacy; motivation; personal life habits and obligations; sustainability competences; GreenComp; transformative pedagogy; Education for Sustainability (ESD); sustainability mindset

1. Introduction

The Covid-19 pandemic has led to a sudden and global transformation of education systems. The rapid transition to distance learning has become a necessity, not a choice. In this context, information technologies and digital literacy have proven to be key prerequisites for the continuity of teaching and the preservation of the quality of the educational process (Daniel, 2020; Woodgate et al., 2015; Babić-Kekez & Popov, 2012; Eleven et al., 2012).

Countries around the world have adapted their education policies and have begun to implement various forms of distance learning — from television and radio programs, through e-learning platforms, to communication via social networks and mobile applications. The digital literacy of students and teachers has become one of the most important factors in the successful implementation of these models (Buchmeister et al., 2013; Link & Marz, 2006).

Research shows that distance learning offers numerous advantages compared to traditional teaching — primarily greater flexibility in organizing time, access to large bases of open educational resources and the possibility of self-timing learning (Jara & Mellar, 2007; Shudayfat et al., 2012; Rapanta et al., 2020). However, this form of teaching requires students to have high motivation, self-discipline and the ability to successfully organize their time and other life commitments (Master & Walton, 2013; Williams & Williams, 2011).

On the other hand, in the absence of direct contact with the teacher, it is necessary to apply strategies that encourage student motivation and active interaction in the online environment (Andrews & Debus, 1978; Rapanta et al., 2020). Moreover, the success of distance learning depends on several factors: the level of digital literacy, personal habits and ability to organize time, as well as the motivation of students for this type of learning (Woodgate et al., 2015; Kebritchi et al., 2017; Coman et al., 2020).

In addition, the rapid shift to online education has highlighted the importance of developing competences that go beyond technical skills, contributing to students' capacity for resilience, autonomy, and long-term sustainability in learning. This perspective resonates with the European Framework for Sustainability Competences (GreenComp), which emphasizes systems thinking, futures literacy, values orientation, and action competence as essential for preparing learners to contribute to sustainable societies.

From this point of view, distance learning can be understood not only as a response to an emergency situation such as the Covid-19 pandemic, but also as a transformative pedagogical approach that fosters sustainability competences. By combining digital literacy ("brain"), practical application ("hands"), intrinsic motivation and values ("heart"), as well as purpose-driven learning ("spirit"), online education can become a vehicle for holistic and sustainable development of learners.

In this paper, precisely those key factors are analysed – in order to see their impact on the quality organization of the learning process in the online environment, as well as to define recommendations for the improvement of educational practice in this domain.

2. Materials and Methods

2.1. Computer Literacy

Computer literacy is often equated with information literacy, although there are important differences between these terms. Information literacy implies the ability to recognize, find, value and effectively use relevant information (American Library Association, 1989), while computer literacy refers to knowledge and skills that enable the use of computer technology in everyday life and learning.

Computer literacy includes the ability to work with operating systems (Windows, Mac, Linux), using standard applications (word processors, spreadsheets, databases, Internet browsers, e-mail), but also understanding the basic principles of computer systems, without necessarily knowing about technical details (Link & Marz, 2006; Daniel, 2020). In modern education, computer literacy has become a key competence that enables active participation in distance learning and lifelong learning (Coman et al., 2020).

Especially during the Covid-19 pandemic, it was shown that a high level of digital literacy is a prerequisite for successfully following online classes (Rapanta et al., 2020). Recent research indicates that students with a higher level of digital competence achieve better results and express a higher level of satisfaction with distance learning (Bond et al., 2021).

In this context, computer literacy is not just a technical skill, but a strategically important part of the educational process, which changes the way knowledge is acquired and transmitted.

2.2. Students' Personal Life Habits and Ability to Organize Learning

Distance learning is a more complex process than traditional teaching, as it requires a high level of independence, self-regulation and time management from students (Woodgate et al., 2015). Distance learning students are often employed, have family responsibilities and must balance learning with other life responsibilities (Coman et al., 2020).

Isolation, lack of direct contact with colleagues and teachers, as well as challenges in using technology further complicate this process (Rapanta et al., 2020). Therefore, adapting personal habits, developing the ability to independently plan and manage time effectively is of crucial importance for successful distance learning (Kebritchi et al., 2017).

Students who successfully overcome these challenges develop a high level of motivation for this type of education (Prskalo, 2012). Key factors include:

- ability to set aside time for distance learning;
- planning and coordination of all obligations;
- overcoming the lack of live interaction;
- willingness to seek help when needed (Kebritchi et al., 2017; Bond et al., 2021).

2.3. Motivation in the Learning Process.

Motivation is one of the most important factors influencing success in distance learning (Williams & Williams, 2011). Even among students with a high level of knowledge and skills, lack of motivation can significantly reduce educational achievements (Pardanjac, Eleven & Karuović, 2014).

Motivation has three key dimensions: direction, intensity and persistence (Deci et al., 1991). Students must clearly identify goals, be willing to make an effort, and maintain consistency in learning over time.

In the context of distance learning, self-motivation is particularly important, as daily contact with teachers and colleagues is absent (Rapanta et al., 2020). Students must develop abilities such as:

- recognition of own goals and educational needs;
- maintaining self-confidence in facing challenges;
- actively seeking contact with colleagues and mentors;
- working with content that is linked to practical examples (Coman et al., 2020).

Recent research (Bond et al., 2021) shows that students who develop good learning strategies and maintain high internal motivation achieve better results and show greater satisfaction with distance learning.

3. Methodology

The aim of this research is to examine the impact of three key factors on the quality of distance learning through quantitative and qualitative analysis:

- the level of computer literacy and technological equipment of students,
- personal life habits and the ability to organize time,
- motivation for distance learning.

In addition, the research aims to contribute to a better understanding of the conditions for the successful implementation of distance learning and to offer recommendations for the improvement of educational practice in this domain.

3.1. Research Questions:

- IP1: Is there a statistically significant positive correlation between the IT equipment and literacy of students and the quality of organized distance learning?
- IP2: Is there a statistically significant positive correlation between students' ability to organize the time needed for learning and the quality of organized distance learning?
- IP3: Is there a statistically significant positive correlation between the level of motivation of students and the quality of organized distance learning?

The results of this research aim to contribute to:

- a better understanding of the key factors of successful distance learning;
- recognizing the challenges and needs of students in this form of education;
- improving educational strategies and providing concrete recommendations for practice — both for teachers and for educational institutions and education policy makers.

3.2. Research Sample

The research was conducted on a representative sample of 360 students from several faculties in Vojvodina (Serbia). The students were between the ages of 19 and 22 and the survey was conducted during the 2020/2021 school year.

The sample was constructed in such a way that it realistically reflects the structure of the student population in terms of gender, age and study program (Table 1.). The target population was about 5,000 students. The sample size provides a confidence level of 95%, with a confidence interval of $\pm 5\%$.

Table 1. Descriptive statistics.

Dimension	Min.	Max.	Mean	Std. Dev.
Age	1	4	2.04	1.04
Gender	1	2	1.72	0.45
Department	1	3	1.83	0.62
Valid N				360

3.3. Research Instrument and Procedure

For the purposes of the research, a questionnaire (Table 2) was used, distributed to students online via (web-survey), as part of the teaching process. Students have previously received clear instructions from teachers on how to fill out the survey.

The questionnaire consisted of a total of 26 questions, divided into two groups:

- First group (15 questions) – evaluation of factors:
 - IP1 – level of computer literacy and technological equipment;
 - IP2 – personal lifestyle habits and ability to organize time;
 - IP3 – motivation for distance learning.
- The second group (11 questions) – students' attitudes and perceptions about the quality of organized distance learning (DE items).

The responses were collected using a five-point Likert scale (from "absolutely agree" to "absolutely disagree"), as well as a three-point scale to assess the experience and quality of distance courses.

3.4. Instrument Reliability

To estimate the internal consistency of the measurement scales, the Cronbach alpha coefficient was used.

The first group of questions (15 items) was organized into three factors:

- IP1 – level of computer literacy and technological equipment (items ST1–ST5),
- IP2 – personal lifestyle habits and ability to organize time (items ST6–ST10),
- IP3 – motivation for distance learning (items ST11–ST15).

The second question is about distance learning.

Prior to calculating Cronbach's alpha for IP3, ST13 ("I think it makes no sense to plan a lot ahead") was reverse-encoded to ensure compliance with positively oriented scale items.

Cronbach's alpha coefficients are:

- IP1 – $\alpha = 0,81$
- IP2 – $\alpha = 0,79$
- IP3 – $\alpha = 0,80$
- DE – $\alpha = 0,82$

Cronbach's alpha values above 0.70 indicate satisfactory reliability of the scales (Nunnally & Bernstein, 1994), which allows these factors to be validly used in further analysis.

Below are the basic descriptive indicators for all items of the questionnaire used in the survey (Table 2).

Table 2. Descriptive statistics of questionnaire items.

Statement	Descriptive Statistics					
	Short name	N	Min	Max	Mean	Std. Dev.
I have technology necessary for distance education (computer and Internet access).	ST1	360	1	2	1.89	0.31
How do you rate your own ability to download and install the software?	ST2	360	1	5	3.67	1.40
I understand basic operations related to working with files: creation, renaming, recording, finding ...	ST3	360	1	5	3.56	1.50
How do you rate your own ability to communicate via e-mail, forums and chat rooms?	ST4	360	1	5	3.65	1.49
I possess strong writing and reading skills, in English language.	ST5	360	1	5	3.13	1.18
Assess your ability to balance the obligations related to the course of distance education and beyond.	ST6	360	1	5	3.26	1.50
I am able to dedicate the time required for the DE course (2-10 h):	ST7	360	1	5	4.14	1.14
How do you rate your ability to assess your needs for learning and understanding the material?	ST8	360	1	5	3.83	1.03
I am able to take the responsibility for getting the necessary help—by asking questions.	ST9	360	1	5	4.53	0.99
Interaction “face to face” is not important to me.	ST10	360	1	5	3.09	1.12
I always persist in achieving my goals.	ST11	360	1	5	3.99	1.15
I am organized, motivated and self-disciplined student.	ST12	360	1	5	4.06	1.30
I think it makes no sense to plan a lot ahead.	ST13	360	1	5	2.70	1.22
One should have a clearly defined goal—at any time.	ST14	360	1	5	4.21	1.20
It is important for me to point out my success.	ST15	360	1	5	4.11	1.13
I have valuable experience in learning from DE courses.	DE1	360	1	3	2.78	0.57
Course materials are appropriate and concise.	DE2	360	1	3	2.74	0.62
The examples and tasks are relevant and useful.	DE3	360	1	3	2.70	0.67
Workload is appropriate to the length of DE class time.	DE4	360	1	3	2.56	0.80
Testing procedures and evaluations are done fair.	DE5	360	1	3	2.66	0.70
The expectations are clearly stated orally or in the program.	DE6	360	1	3	2.64	0.72
The instructors encouraged me to become actively involved in the course’s discussions.	DE7	360	1	3	2.82	0.44
The instructors provided me feedback on my work through comments.	DE8	360	1	3	2.71	0.67
I was able to interact with the instructors during the course’s discussions.	DE9	360	1	3	2.75	0.64
The instructors treated me individually	DE10	360	1	3	2.70	0.68
The instructors informed me about my progress periodically.	DE11	360	1	3	2.84	0.48
Valid N°		360				

3.5. Statistical Data Processing

The collected data were analyzed using descriptive statistics and Pearson’s correlation coefficient, with the help of the statistical software package SPSS.

The aim of the statistical analysis was to determine:

- the existence of a positive correlation between the analyzed factors and students’ attitudes towards the quality of organized distance learning;
- the level of statistical significance of the identified links.

4. Results

4.1. Results of the First Research Question

Below are the results of the analysis of the correlation between the level of computer literacy and technological equipment of students with their attitudes towards the quality of organized distance learning

Table 3 presents an overview of the results related to the assessment of the level of computer literacy and technological equipment of students. The data obtained confirms that the majority of students have the technical conditions and digital skills necessary for successful distance learning.

Table 3. Respondents' answers on the level of computer literacy and technological equipment (in percentage).

Attitude	Absolutely agree	Agree	No opinion	Disagree	Absolutely disagree
ST1	89	0	0	0	11
ST2	42	14	21	12	11
ST3	41	16	18	9	16
ST4	48	8	19	12	13
ST5	11	31	30	15	13

The results of the survey show that 89% of students have computer technologies and access to the Internet (see Table 3, ST1). Given that a large number of students have high-speed internet at home, they have no problem downloading materials and installing software. A large number of respondents (56%) believe that they are able to download material and install software, the number of those who do not feel confident in this matter is 23%, while 21% have no opinion (ST2). The basic procedures over files (copying, deleting, renaming files and folders) are also known to the vast majority of students (57% agree and absolutely agree), 9% disagree, 16% absolutely disagree, while 18% are still left without an attitude (ST3). The fact is that today almost everyone has computer equipment and smart mobile phones, which, through appropriate applications, can access distance learning courses and allow you to download materials. At the same time, interaction with other students and instructors takes place via email, forums, and chat (56%). A smaller number of students prefer verbal communication (25%), while 19% did not have an opinion (ST4). 42% of respondents possess strong English reading and writing skills (ST5).

The results of the research show that the respondents have a computer and access to the Internet, as well as developed computer literacy. A statistically significant positive correlation (Table 4.) can be observed between item ST1 and items DE1 (0.47 significance level $p < 0.01$), DE2 (0.49** significance level $p < 0.01$) and DE3 (0.51** significance level $p < 0.01$). Thus, students are able to effectively participate in distance learning and have a positive experience.

They are able to download all the material and tasks that the courses offer them, to install the necessary software, as well as to create, record and find the desired files – which is confirmed by the statistically significant positive correlation between the items ST2 and DE2 (0.34** significance level $p < 0.01$); DE3 (0.35** significance level $p < 0.01$), as well as ST3 and DE2 (0.32** significance level $p < 0.01$); DE3 (0.37** significance level $p < 0.01$).

Given that students have a positive experience working with computer equipment, the use of e-mail, forums and chat is not a problem for them. This form of communication is used to consult with teachers and other students regarding any ambiguities during the learning process – a positive correlation between item ST4 and DE7 (0.23** significance level $p < 0.01$) is confirmed; DE9 (0.34** significance level $p < 0.01$).

Based on the above results, it can be concluded that students do not show significant obstacles in the use of digital technologies that require distance learning, which is confirmed by the existence of a statistically significant positive correlation between the factors of computer literacy and equipment with the quality of organized distance learning.

Table 4. Correlation between computer literacy and equipment and attitudes towards distance learning quality (Pearson correlation).

	DE1	DE2	DE3	DE4	DE5	DE6	DE7	DE8	DE9	DE10	DE11
ST1	0,47**	0,49**	0,51**	0,58**	0,49**	0,48**	0,24**	0,61**	0,03	0,68**	0,21**
ST2	0,14**	0,34**	0,35**	0,34**	0,30**	0,35**	0,14**	0,20**	0,24**	0,26**	0,03
ST3	-0,02	0,32**	0,37**	0,23**	0,13	0,20**	0,17**	0,11*	0,24**	0,11*	-0,02
ST4	-0,00	0,09	0,11*	0,26**	0,16**	0,15**	0,23**	0,09	0,34**	0,13*	0,02
ST5	-0,03	0,02	0,25**	0,01	0,15**	0,09	0,08	0,10	0,16**	0,07	-0,01

Based on the presented results, the first research question was confirmed – computer literacy and student equipment statistically significantly contribute to the quality organization and efficiency of distance learning

4.2. Results of the Second Research Question

An analysis of the results related to the second research question (Table 5.) indicates that 47% of students believe that they are able to successfully reconcile the obligations related to distance learning with other life obligations (ST6). A total of 33% of students disagree or absolutely disagree with the statement, while 20% of respondents remained neutral (they do not have a clear opinion on this statement). Table 5 presents the data on the personal life of the respondents.

Table 5. Respondents' responses to personal life habits and time management skills (in percentage).

Attitude	Absolutely agree	Agree	No opinion	Disagree	Absolutely disagree
ST6	32	15	20	14	19
ST7	53	23	12	8	4
ST8	22	57	7	9	5
ST9	75	13	5	3	4
ST10	13	21	35	24	7

Table 5 presents descriptive data related to students' personal life habits and ability to organize their time.

The majority of students (53%) say they can set aside more than 10 h per week for distance learning, while 23% set aside about 8 h, 12% 6 h, 8% 4 h, and 4% only 2 h per week (ST7).

More than a fifth of students (22%) believe they are extremely capable of assessing their learning needs and understanding of the material, while 57% believe they are capable and 7% are hesitant. Only 14% of students disagree with this statement (9% disagree, 5% disagree absolutely) (ST8).

The vast majority of students (88%) have no problem actively seeking help, either from colleagues or from professors via email or forums. A smaller number of students (3% disagree, 4% absolutely disagree), while 5% have no opinion on this statement (ST9).

When it comes to the importance of face-to-face contact with teachers, students' attitudes are divided: for 34% the lack of such contact is a problem, 35% have no attitude, while for 31% of students it is not a problem (ST10).

Table 6. Correlation between students' personal life habits and ability to organize their time with their perceptions of the quality of distance learning. (Pearson correlation).

	DE1	DE2	DE3	DE4	DE5	DE6	DE7	DE8	DE9	DE10	DE11
ST6	0,41**	0,11**	0,25**	0,15**	0,12*	0,09	0,10	0,14**	0,15**	0,17**	0,03
ST7	0,36**	0,43**	0,43**	0,35**	0,41**	0,35**	0,27**	0,35**	0,06	0,42**	0,23**
ST8	0,30**	0,41**	0,35**	0,65**	0,37**	0,37**	0,14**	0,33**	-0,03	0,36**	0,07
ST9	0,25**	0,30**	0,23**	0,24**	0,23**	0,27**	0,52**	0,30**	0,09	0,36**	0,19**

ST10	0,21**	0,08	0,12*	0,18**	0,07	0,13*	0,08	0,49**	0,00	0,48**	0,41**
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Table 6 shows that there is a statistically significant positive correlation between different aspects of personal life habits and the ability to organize time and perception of the quality of distance learning.

In particular, there is a correlation between the ability to reconcile life and educational obligations (ST6) and the overall positive experience with distance learning (DE1; $r = 0.41^{**}$, $p < 0.01$). Students who successfully balance their responsibilities show a more positive attitude towards the quality of online teaching.

Also, students who successfully set aside enough time for learning (ST7) achieve positive correlations with almost all dimensions of course quality, including the content of the material (DE2; $r = 0.43^{**}$) and relevance of examples and tasks (DE3; $r = 0.43^{**}$).

The ability to properly assess one's own learning needs (ST8) shows the highest correlation with the adequacy of the course load (DE4; $r = 0.65^{**}$) and with the clarity of the teaching materials (DE2; $r = 0.41^{**}$), which emphasizes the importance of self-regulation skills in the distance learning process.

Students who are willing to actively seek help (ST9), as well as those for whom the lack of face-to-face communication (ST10) is not an obstacle, have positive correlations with dimensions such as encouraging active participation (DE7; $r = 0.52^{**}$) and receiving feedback from teachers (DE8; $r = 0.49^{**}$).

Based on these results, it can be concluded that personal life habits and the ability to organize time are significantly associated with a positive experience and perception of the quality of distance learning, thus confirming the second research question.

4.3. Results of the Third Research Question

The results of the research show that students are largely organized, motivated and self-disciplined in the distance learning process. In fact, 70% of students estimate that they have developed organizational skills and the ability to manage learning independently (Table 7, ST11). Although 12% of students express some doubts about their organizational abilities, and 18% do not have a clear position on this issue, the majority still successfully plan their activities.

Although less than half of respondents (48%) believe that it is necessary to plan ahead (ST13), as many as 75% of students state that they have clearly defined learning goals (ST14), which further encourages their motivation to achieve these goals — 70% declare themselves motivated and engaged (ST12).

Also, the sense of achievement is expressed: 76% of students say that they are proud of their success and want to share it and present it to others (ST15). These data indicate a high level of intrinsic motivation and a positive attitude of students towards distance learning.

Table 7. Respondents' answers about IP3 — motivation for distance learning (in percentage).

Attitude	Absolutely agree	Agree	No opinion	Disagree	Absolutely disagree
ST11	45	25	18	8	4
ST12	57	13	16	5	8
ST13	11	14	27	31	17
ST14	61	14	15	5	5
ST15	50	26	12	8	4

Based on the results obtained, it can be concluded that students are organized, motivated, and self-disciplined, and that they are able to realistically assess their learning needs. Most of them successfully plan and allocate enough time for distance learning, effectively organize their obligations, and despite the lack of constant direct contact with teachers, manage to work efficiently with teaching materials and the online environment. These findings indicate that intrinsic motivation and developed self-regulation strategies significantly contribute to quality distance learning and strengthen students' engagement.

Table 8 shows the correlation between the level of motivation of students and their perceptions of the quality of organized distance learning.

Table 8. Correlation between the degree of motivation and the quality of organized distance learning.

	DE1	DE2	DE3	DE4	DE5	DE6	DE7	DE8	DE9	DE10	DE11
ST11	0,30**	0,46**	0,44**	0,41**	0,48**	0,45**	0,26**	0,36**	0,13*	0,43**	0,13*
ST12	0,33**	0,54**	0,56**	0,48**	0,41**	0,48**	0,26**	0,40**	0,20**	0,48**	0,18**
ST13	0,08	0,02	0,22**	-0,14**	0,06	-0,10	0,05	0,31**	-0,01	0,30**	0,31**
ST14	0,34**	0,43*	0,55**	0,39**	0,43**	0,43**	0,31**	0,42**	0,28**	0,51**	0,15**
ST15	0,35**	0,42**	0,42**	0,35**	0,40**	0,34**	0,27**	0,34**	0,08	0,42**	0,23**

The results show that students are highly motivated, organized, and self-disciplined for distance learning. Having effective learning strategies and setting realistic and clearly defined goals contributes significantly to their success, as confirmed by the following statistically significant positive correlations:

- ST11 (persistence in achieving goals) and DE6 (clarity of expectations) → $r = 0.45$, $p < 0.01$;
- ST12 (organization, motivation and self-discipline) and DE6 → $r = 0.48$, $p < 0.01$;
- ST14 (clearly defined targets) and DE6 → $r = 0.43$, $p < 0.01$.

Further, the desire to achieve success and positively valuing one's own achievements (ST15) is associated with a better overall distance learning experience:

- ST15 and DE1 (positive distance learning experience) → $r = 0.35$, $p < 0.01$.

Also, the feedback students receive from their teachers — during courses, through comments, and interaction in forums — has an additional positive effect on their motivation and engagement in distance learning.

In conclusion, the results of the research confirm that IT equipment and literacy, personal time management habits, as well as motivation for distance learning, are statistically significantly related to the quality of organized distance learning. Thus, the main hypothesis of the research is fully confirmed.

5. Discussion

The analysis confirmed that digital literacy, time management, and motivation are strongly related to the perceived quality of distance learning, which allows these findings to be further interpreted in light of sustainability competence development. Thus, the goal of the research has been achieved, and all aspects of the research questions posed are clearly supported by the findings.

The first research question (IP1) confirmed that a high level of digital literacy and access to computer technology enable students to effectively navigate the online environment. Students who have greater digital competencies manage learning more easily, show a higher level of satisfaction, and achieve better results. These findings are consistent with research by Coman et al. (2020), Rapanta et al. (2020), as well as Bond et al. (2021), which highlight digital skills as the foundation for successful online education.

The second research question (IP2) shed light on the importance of self-regulation and time management skills. Students who successfully balance learning and other obligations, who know how to assess learning needs and are ready to ask for help, have a much more positive attitude towards distance learning. This confirms the views of authors such as Kebritchi et al. (2017) and Woodgate et al. (2015), who emphasize the importance of flexible planning and personal responsibility in e-learning.

The third research question (IP3) highlighted the importance of intrinsic motivation and organization in successful learning. Students with clear goals, perseverance, and a desire to succeed have a more positive experience and better value all aspects of the courses. The findings are consistent with Williams & Williams (2011), as well as more recent research by Bond et al. (2021) and Martin &

Bolliger (2022), which suggest that motivation directly influences engagement and online learning outcomes.

At the same time, the data obtained in this research indicate that even the lack of direct communication with the teacher is not a significant obstacle for most students. Instead, feedback, asynchronous interaction, as well as the ability to adapt to online formats play a significant role, which is consistent with the findings of Rapant et al. (2020) and Richardson et al. (2023), which highlight the importance of “online presence” and social interaction in digital classrooms.

Beyond these findings, the results can also be interpreted in light of sustainability competence development. Digital literacy (IP1) does not only enable technical access but also fosters adaptive learning strategies that prepare students for continuous learning in rapidly changing contexts — a key element of sustainability. The ability to balance personal obligations with study requirements (IP2) directly reflects self-regulation, resilience, and responsibility, which are identified in the GreenComp framework as core sustainability competences. Finally, intrinsic motivation and clear goal-setting (IP3) connect to values thinking and futures literacy, helping students to align their learning with broader societal goals and long-term visions.

From this perspective, the study contributes to the field of transformative pedagogies for sustainability by showing that distance learning environments can nurture the “whole person” — combining cognitive skills (“brain”), practical abilities (“hands”), personal motivation and values (“heart”), and long-term purpose (“spirit”). This holistic approach underlines how distance education can act as a pathway toward fostering sustainability mindsets in higher education.

It is important to point out that the results of this research are not only a confirmation of theoretical assumptions, but also a basis for the improvement of educational practice. Approaches that encourage the development of digital literacy, self-regulation and motivation in students, as well as those that provide quality communication and support, are key to the successful implementation of distance learning—both in crisis situations such as the pandemic, and in the context of modern hybrid teaching models (Rapanta et al., 2023).

6. Conclusion and Recommendations

In the context of modern trends in education, distance learning is increasingly functioning as part of blended (hybrid) models, rather than as a temporary substitute for face-to-face teaching. The findings of this research show that digital literacy, the ability to organize time independently, and motivation are key factors for success in distance learning. The majority of students showed a high level of organization, self-discipline and clearly defined goals, which significantly contributes to positive experiences in the online environment.

Based on the results obtained, the following recommendations for educational practice can be formulated:

- It is necessary to continuously develop digital competencies in students through formal and informal education.
- Teachers should further strengthen their presence in the digital space, providing clear feedback and encouraging active student participation.
- It is necessary to provide support to students in developing self-regulation strategies, time management and goal setting.
- Educational institutions should develop blended teaching models that encourage flexibility, but also maintain high interactivity and personalized support.

While the results of this study offer valuable insights, there are some limitations:

- The research was conducted on a sample of students from one region, which may limit the applicability of the results to a wider population.
- A cross-sectional approach is used, which does not involve changes over time.
- Only self-assessment data were used, without including objective indicators of success or teachers’ attitudes.

Future research should include more diverse samples and the application of a combined method (quantitative and qualitative) in order to take a deeper look at the success factors in distance learning. It is also recommended to conduct longitudinal studies and include the perspective of teachers in order to more fully evaluate the effectiveness of online education.

In addition, this study highlights that the analysed factors – IT literacy, self-regulation, and motivation – can be interpreted as essential components of sustainability competence development. Digital literacy equips students with adaptive learning capacities for a fast-changing world; time management and responsibility reflect resilience and action competence; while motivation and clear goals connect to values thinking and futures orientation.

Therefore, the findings support the argument that distance learning, if designed and implemented through transformative pedagogies, contributes not only to the efficiency of education but also to building a sustainability mindset. By fostering the integration of “brain” (knowledge), “hands” (skills), “heart” (values and motivation), and “spirit” (purpose and long-term vision), distance education can become a powerful driver of Education for Sustainability (ESD) in higher education.

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