

Article

The Effects of Temper Traits and Study Method (Full-Time vs. Extramural) on Polish Students' Adaptability to Online Learning as a Result of COVID-19. A Pilot Study

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Abstract: COVID-19 has forced students to readjust to online learning. The current study aimed to investigate attitudes of Polish students towards online education, relationships between learning preferences and temper traits, and differences in learning preferences among extramural and full-time students. The study recruited 185 college students between May and June 2021. The findings indicated between group differences in learning preferences, with extramural students preferring online education slightly more than full-time students. Two temper traits, briskness and activity, appeared to be significant predictors of positive attitude towards online learning. However, as this was a pilot study, further investigations are recommended.

Keywords: temperament; RTT theory; online learning; students; extramural studies; full-time studies; COVID-19



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1. Introduction

The coronavirus disease 2019 (COVID-19), announced as a pandemic by the World Health Organization on 11 March 2020, resulted in many changes in human life around the world. Education has been particularly affected, as the majority of classroom learning was replaced by home-based online learning, especially at universities. Neither students nor lecturers were prepared for such a revolution in terms of using online tools, new methods of communication, and limited direct interactions with peers and colleagues. Therefore, for many of them, online education caused potential difficulties. However, evidence suggests that after the initial shock, some staff and students adjusted to the situation, and even found some advantages to online education [1,2]. In fact, some predict that elements of online learning will remain when the COVID-19 pandemic is over [3–5]. Therefore, it would be beneficial to measure students' and lecturers' attitudes toward online learning, as well as factors that affect adaptation to this increasingly common form of education.

The current study's groups of interest are BA and MA students (full-time and extramural studies) of one of the biggest universities in Poland. The study aimed to find out whether the students preferred online or offline learning and whether factors such as psychological characteristics (i.e., temperament) affect their learning preferences.

1.1. Online vs. Offline Education—Different Cultures and Psychological Fit

Some academics have compared online and traditional face-to-face classroom education to two distinct cultures [6], defined by different environments, norms, methods of communication, participant requirements, etc. (see also: [7,8]). However, not all students and staff are equally equipped to meet these different requirements due to experience and/or better psychological fit.

The main change in students' lives as a result of the COVID-19 lockdowns was a need to learn via online educational platforms. Despite young people (generation Z) being

familiar with the Internet, the sudden increase in learning through online platforms was a rather new experience and substantial change for most of them. Technology acceptance models (TAM) indicate that psychological factors such as self-efficacy, perceived enjoyment, computer anxiety, and intrinsic and extrinsic motivation [9,10] play a key role in adapting to work with new technologies. Moreover, using online platforms may also be associated with different information processing in comparison to traditional classroom education. In accordance with some concepts, cognitive functions relate to personality to some extent [11–13].

Another difference between conventional education and online learning is the substantial limitation of social interactions and, therefore, a reduction in stimulation. Some studies indicate that the need for stimulation can be a significant factor in social behavior [14] and a preference for less stimulating environments is characteristic for introverts [15]. As such, students who do not need intense contact with others to feel good (introverts) may adapt to the new situation associated with COVID-19 better than their sociable and talkative peers. This theory was partially supported in a study by Rettew et al. [16], conducted from the pre-COVID-19 to the COVID-19 period (January–May 2020). The results showed a decrease in mood among students with higher levels of extraversion during the study period, while mood ratings among those with a lower level of extraversion rose slightly.

Nevertheless, significant changes in life, even positive, are regarded as stressful (see: [17]), as seen in studies conducted among students during COVID-19 [18–20]. Stressful situations are sources of additional stimulation. Some people demonstrate a higher need for stimuli, so there are students who might cope with changes resulting from COVID-19 better than others and therefore display more positive attitude to such changes.

The ability to cope with the demands of different environments depends on personality to a large extent. In the current study, temper traits were considered as potential factors determining each student's ability to adapt to the changes in their educational environment. The APA describes temperament as the biologically determined foundation of personality. It includes *such characteristics as energy level, emotional responsiveness, demeanor, mood, response tempo, behavioral inhibition, and willingness to explore* [21]. Some academics consider the concept of temperament in the framework of the biological approach (perspective) to personality [22]. So far, many theories and models of temperament have been developed (see: [23]). This study used the regulative theory of temperament (RRT) by Jan Strelau [24–26]. As the concept of RRT was being tested for almost 50 years and verified by other researchers in many studies [25], it seems one of the best developed theories of temperament, however, not as popular as others. According to this concept, temperament is described by formal characteristics of behavior, which are divided in terms of time features, briskness, perseverance, and rhythmicity, and energy features, sensory sensitivity, endurance, emotional reactivity, and activity [27]. These characteristics moderate human reactions, regulating the relationship between the individual and the environment [25]. In the current study, this relationship is formed by the student and the learning environment: online and face-to-face classroom education. Adaptation to these two environments may require, among others, different psychological skills, both cognitive abilities and personality dispositions [7–10]. Characteristics of the RRT relate as well to cognitive functioning as to personality traits. For example, endurance relates to the ability to maintain adequate reactions in situations demanding long-lasting and highly stimulating activity, which relates to sustaining attention. Briskness is a tendency toward quick reactions and shifting easily in response to changing conditions, what is associated with alternating attention. Moreover, activity is the tendency to undertake stimulative behaviors, which is distinctive for extraversion [15]. Due to the complexity of temper characteristics in the RRT, which combine elements of information processing, affect, and behavioral reactions, the application of this concept in the current study seems to be adequate.

The COVID-19 pandemic occurred suddenly and lasted a relatively short time, so there is limited literature on the relationship between attitudes toward the consequences of

lockdown and temper characteristics. The only one, to date, found by the author is the work by confirmed that temperament (according to the concept of Akiskal and Akiskal, [28]) may be associated with developing a COVID-19 mental health burden [29]. Many more investigations explored and confirmed to some extent the role of the Big Five personality traits [15] in adjustment to the COVID-19 pandemic situation [16,30–34].

In sum, there are differences between conditions of work in physical classrooms and online learning, constituting two different environments (cultures). Depending on trait personality, abilities, skills, and experience, students can be fitted better to one environment (i.e., type of education). So, as students feel more comfortable in one of the environments, it was assumed that:

Hypothesis 1 (H1). *They differ to each other in preference for education type—online or conventional learning.*

Based on previous findings concerning correlations between personality and adapting to COVID-19-related circumstantial changes, as well as assumptions of TAM, it was hypothesized that:

Hypothesis 2 (H2). *Temper characteristics play a significant role in positive attitude towards online learning.*

1.2. Full-Time vs. Extramural Studies

The problem of motivation in online learning was recognized by academics before COVID-19 caused the sudden increase in its use [35,36]. As participation in online courses is more anonymous, it is easier to zone out and/or do something unrelated to the lecture than in physical classrooms. Some studies also observed a decrease in motivation among students who experienced e-learning [37,38]. Thus, it seems that in comparison to traditional education, distance learning may require more determination and self-discipline from students. This is a question of personality traits, such as diligence or a strong will. However, external and internal motivators may also significantly affect attitudes towards the use of educational technologies [10].

Investigations show that time efficiency, flexibility, and convenience are the main advantages of online learning [39,40], and these factors seem especially important to extramural students. In Poland, such studies are a form of higher education, which involves attending classes or lectures during weekends. It relates to any education pursued beyond the high school level, i.e., undergraduate and graduate certificates and bachelor's, master's, and doctoral degrees. Such studies are paid and are addressed rather to active working people, unlike full-time studies. According to Statistics Poland, in 2019, there were 1.2 million students in total [41], and about 34% of them (413,310) were students of extramural studies, indicating that such programs are very popular in Poland. Extramural studies usually take place on weekends, when it is convenient for students who have regular work. However, such form of work and education is very exhausting because time for rest is very limited, significantly disrupting their work–life balance. For these students, saving time through online learning (reduced commuting, more opportunities to do several things simultaneously) can be much more important in comparison to full-time students, and constitute additional external motivators to accept online learning. Therefore, it was assumed that:

Hypothesis 3 (H3). *Extramural students tend to prefer online education to a greater extent than full-time students.*

2. Materials and Methods

2.1. Sample

The sample consisted of 185 college students, recruited from one of the biggest universities in Poland. Most of them were female (151; 81.6%). The mean age of respondents was 23.17 (SD = 4.01), ranging from a minimum of 18 to a maximum of 41 years old. Respondents participated in Management or Economics programs, in BA (126; 68.1%) or MA (59; 31.9%) degrees, and in full-time (91; 49.2%) or extramural (94; 50.8%) studies.

2.2. Research Procedure

The data were collected between May and June 2021, more than a year after the shift from classrooms to home learning at universities in Poland. Thus, students were adequately experienced with online learning and were able to compare the modes of learning. Information about the research was provided to students during classes and via e-mails. All participants were reminded (verbally during classes, via e-mail, and on the research website) that there was no obligation to participate in the study, and they were free to withdraw at any time. Before proceeding to the research, respondents expressed their intention to participate in the study in online written informed consent. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Jagiellonian University.

All statistical analyses were performed with IBM Statistics 27.

2.3. Research Measures

2.3.1. Positive Attitude towards Online Learning Scale

To measure preference of learning mode (online vs. face-to-face) the 10-item survey, the Positive Attitude towards Online Learning Scale (PATOL Scale) was developed by the author. The items were scored using a 4-point scale from '1'—Definitely disagree to '4'—Definitely agree. To use results of the survey in statistical analyses, some items were reversed (i.e., 3, 5, 6, and 10). Basic psychometric properties of the survey were examined through factor analysis and reliability coefficients. The structural validity of the survey was performed using the polychoric principal component analysis with varimax rotation (details are shown in Table 1). First, polychoric correlations were computed. Next, based on the polychoric correlation matrix, the polychoric principal component analysis was performed. The analysis revealed 2 factor solutions. The reliability of the scale was satisfactory, with a ordinal alpha of 0.90 for factor 1, and 0.88 for factor 2.

Table 1. Results of pPCA of the PATOL (n = 185).

	Factor 1	Factor 2
1. I prefer online learning to learning in physical classrooms	0.91	0.12
2. It seems to me that I make use of online learning to a greater extent than classroom-based education	0.69	0.21
3. I miss face-to-face learning	0.79	0.01
4. I find myself learning very well online	0.72	0.44
5. The quality of online education is worse than face-to-face learning	0.14	0.90
6. Online education does not replace traditional learning	0.49	0.06
7. I would like to combine elements of online and face-to-face learning in the future	0.80	0.25
8. I don't care how lessons are conducted—online or face-to-face	0.68	0.04
9. I am very active during online lessons (I try to be present on all lessons listening, making notes, doing homework, asking questions, commenting, and so on)	0.12	0.88
10. During online lessons, I spend most of the time engaged in activities other than learning (browsing the internet, looking at smartphone, doing housework, doing my job, and so on)	0.73	0.35
SS loadings	4.36	2.01
Proportion var	0.44	0.20
Proportion Explained	0.68	0.32

2.3.2. Formal Characteristics of Behavior–Temperament Inventory (FCB-TI(R))

Characteristics of temperament were measured using the revised version of Strelau and Zawadzki’s Formal Characteristics of Behavior–Temperament Inventory (FCB-TI(R); [27,42]. The questionnaire consists of 7 subscales measuring: briskness (15 items), perseverance (15 items), rhythmicity (10 items), sensory sensitivity (15 items), endurance (15 items), emotional reactivity (15 items), and activity (15 items). The items were scored using a 4-point scale from ‘1’—Definitely disagree to ‘4’—Definitely agree.

3. Results

3.1. Online or Face-to-Face? Learning Preferences and Attitudes

Percentages were calculated combining responses to the statements as follows: as agreement (*I agree* and *I definitely agree*) and disagreement (*I disagree* and *I definitely disagree*). To assess learning preferences, two items of the PATOL survey were taken into consideration (items 1 and 8 in Table 1).

The results indicated that students differ from each other in terms of learning preferences. In answer to the statement *I prefer online learning to learning in physical classrooms*, approximately the same number of students expressed approval (48%) as disapproval (52%). Furthermore, 80% of respondents were not indifferent to how classes are taught.

Regarding the quality of education, students seem to value traditional learning more highly than distance learning, with the majority (73%) agreeing that *online education does not replace traditional learning*. Despite this, however, the quality of classroom-based education was rated only slightly higher than online learning (57% and 43%, respectively). Moreover, only one third of respondents found that they use online learning to a greater extent than classroom-based education.

It seems that most students adapted to the new form of learning because nearly 68% of them stated that they find themselves learning very well online. Although 64% of students miss traditional classroom education, 84% of respondents admitted the best way is to combine elements of both types of education in the future.

Finally, the results regarding activity during online learning were inconclusive. On the one hand, half of the respondents admitted to spending most of their time on activities other than learning, but on the other hand, 68% of students are very active during classes. Details are shown in Figure 1.

3.2. Who Prefers Online Learning More—Full-Time or Extramural Students?

In order to verify Hypothesis 3, concerning differences in learning preferences between full-time and extramural students, a series of *U* Mann–Whitney tests were conducted on each item of the survey.

The results show that extramural students seem to prefer online learning to a greater extent than full-time students. Statistical differences were observed in all but two items, with the groups agreeing to an equal extent that online learning does not replace traditional face-to-face education and that elements of both forms of learning should be combined. Details are shown in Table 2.

Table 2. Results of *U* Mann–Whitney tests in groups of full-time ($n = 91$) and extramural students ($n = 94$).

	Full-Time Students ($n = 91$)	Extramural Students ($n = 94$)	<i>U</i> Mann–Whitney
1. I prefer online learning to learning in physical classrooms	2.28 (0.85)	2.81 (0.94)	2889 ***
2. Online education does not replace traditional learning	3.11 (0.79)	2.88 (0.93)	4790.5 (ns)
3. I miss face-to-face learning	3.01 (0.83)	2.61 (0.92)	5224.5 **
4. I find myself learning very well online	2.77 (0.78)	3.01 (0.82)	3499.5 *
5. I am very active during online lessons (I try to be present on all lessons listening, making notes, doing homework, asking questions, commenting, and so on)	2.66 (0.85)	3.01 (0.80)	3271 **

Table 2. Cont.

	Full-Time Students (n = 91)	Extramural Students (n = 94)	U Mann–Whitney
6. I don't care how lessons are conducted—online or face-to-face	1.87 (0.66)	2.10 (0.73)	3535 *
7. It seems to me that I make use of online learning to a greater extent than classroom-based education.	1.98 (0.79)	2.43 (0.90)	3066 ***
8. I would like to combine elements of online and face-to-face learning in the future	3.09 (0.82)	3.27 (0.75)	3741 (ns)
9. During online lessons, I spend most of the time engaged in activities other than learning (browsing the internet, looking at smartphone, doing housework, doing my job, and so on)	2.66 (0.78)	2.35 (0.90)	5090 *
10. The quality of online education is worse than face-to-face learning	2.88 (0.89)	2.51 (0.83)	5287 **

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

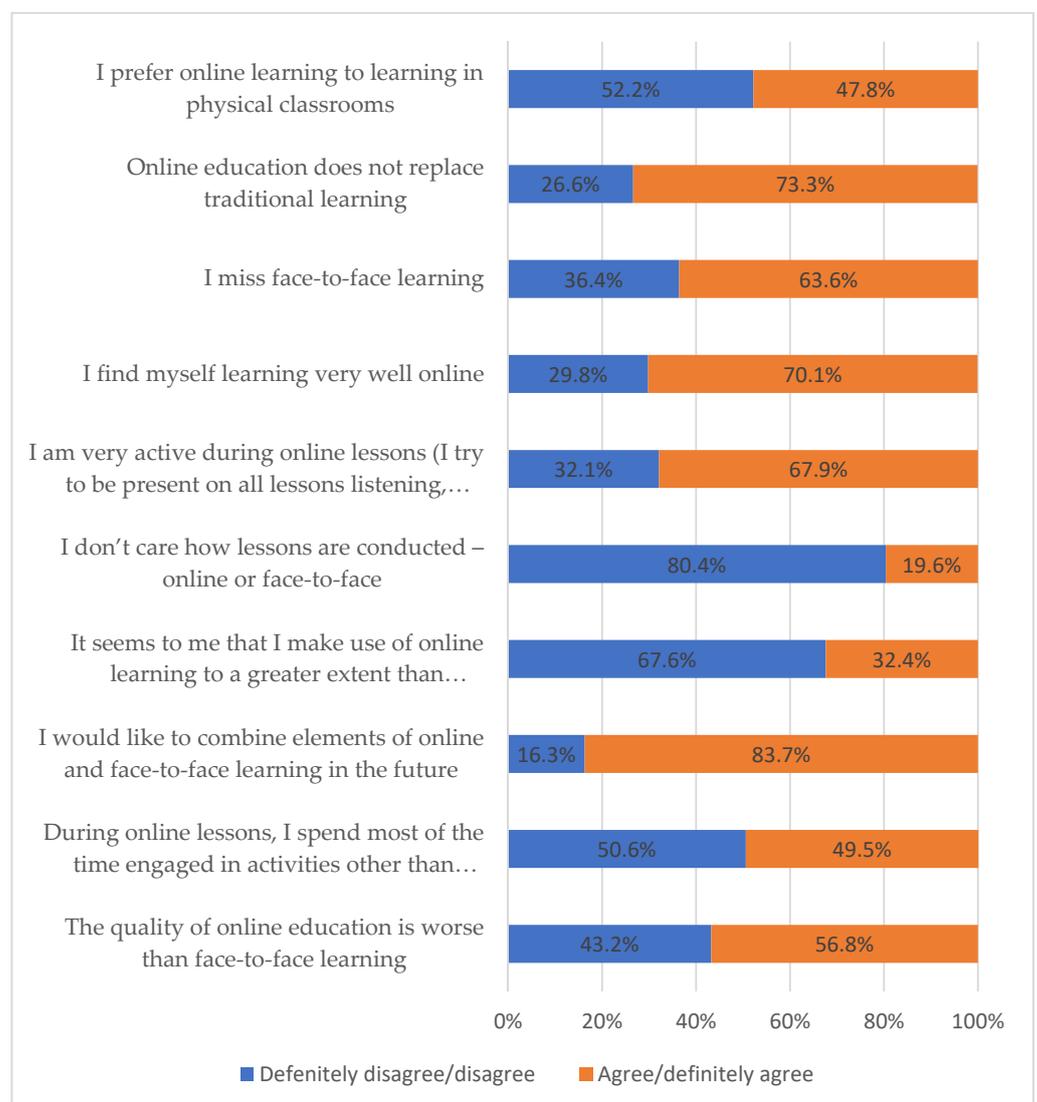


Figure 1. Students' attitudes towards online learning. Note: Responses to the statements were combined as follows: *I definitely disagree* and *I disagree* (disagreement) and *I agree* and *I definitely agree* (agreement).

Additionally, a one-way ANCOVA was performed with group as the independent variable, the total survey result as the dependent variable, and age and sex as control variables. The results showed a statistical difference between full-time and extramural

students in online learning preference, $F(1, 180) = 9.888, p < 0.001$; however, the effect size appeared to be small ($\eta^2 = 0.05$).

3.3. Characteristics of Temperament and Learning Preferences

Correlation analyses revealed significant relations between positive attitude towards online learning and the method of studying ($r_s = 0.30; p < 0.01$), activity ($r_s = -0.16; p = 0.034$), and briskness ($r_s = 0.14; p = 0.051$). Details are shown in Table 3.

Table 3. Spearman's correlation coefficient matrix of the measured variables (n = 184).

	1	2	3	4	5	6	7	8	9	10
1. PATOL	-									
2. Factor 1	0.97 **	-								
3. Factor 2	0.56 **	0.34 **	-							
4. Emotional reactivity	-0.00	-0.01	-0.04	-						
5. Perseverance	-0.11	-0.11	-0.08	0.54 **	-					
6. Activity	-0.16 *	-0.15 *	-0.11	-0.31 **	-0.23 **	-				
7. Briskness	0.14 *	0.12	0.19 *	-0.31 **	-0.26 **	0.20 **	-			
8. Rythmicity	0.07	0.05	0.09	-0.12	-0.18 *	0.05	0.17 *	-		
9. Sensory sensitivity	0.09	0.06	0.13	0.04	0.24 **	0.12	0.11	0.06	-	
10. Endurance	0.06	0.05	0.07	-0.39 **	-0.31 **	0.35 **	0.33 **	0.00	0.09	-
11. Study method	0.30 **	0.39 **	0.27 **	0.10	0.06	-0.16 *	0.03	-0.04	0.06	0.08
M	2.42	2.67	2.45	2.77	3.09	2.56	2.75	2.14	2.90	2.28
SD	(0.60)	(0.75)	(0.55)	(0.58)	(0.41)	(0.52)	(0.45)	(0.57)	(0.31)	(0.53)

* $p < 0.05$; ** $p < 0.01$.

To determine which variables predict positive attitudes towards online learning (PATOL), a stepwise regression analysis was performed. Multicollinearity diagnostics using tolerances/VIF's indicated that the analysis has no substantive multicollinearity problems. All tolerances are greater than 0.79, and all VIFs are less than 1.3.

The results indicated that the three predictors explained 15% of variance in the final model. It was found that the method of studying ($\beta = 0.27, p < 0.001$) and only two of the seven studied temper traits, briskness ($\beta = 0.23, p = 0.001$) and activity ($\beta = -0.15, p = 0.035$), significantly predicted a positive attitude towards online learning. Details are shown in Table 4.

Table 4. Summary of stepwise regression analysis for variables predicting positive attitude towards online learning (n = 184).

Step	Predictor	B	SE	Beta	R ²	R ² Change	F	95% Confidence Interval for B
1	Study method	0.331	0.078	0.300 ***	0.090	0.090	17.981 ***	(0.177–0.485)
2	Study method	0.324	0.077	0.293 ***	0.129	0.039	8.093 **	(0.173–0.475)
	Briskness	0.242	0.085	0.197 **				(0.074–0.410)
3	Study method	0.298	0.077	0.270 ***	0.150	0.021	4.491 *	(0.146–0.449)
	Briskness	0.282	0.086	0.230 ***				(0.111–0.452)
	Activity	-0.161	0.076	-0.151 *				(-0.311–-0.011)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

4. Discussion

The aim of the current study was to measure Polish students' attitudes towards online education and the relationships between learning preferences and temper traits, and method of studying. Findings indicated differences in students' preferences for online or face-to-face learning. Although the entire sample agreed with some aspects of learning (like a preference for a combination of both types of learning), the students were not, as a whole group, in favor of one mode of education. Similarly, Dikaya et al. [43] found that students were divided into relatively equal groups by their attitude (positive or negative) towards online learning. It means, that different factors may be responsible for the preference for each mode of education.

Analyzing students' attitudes to online and classroom education in detail showed that traditional education was rated higher than online learning, with the vast majority of students stating that *online education does not replace traditional learning*. These findings are accordance with other studies [1,2]. And while most students stated that they find themselves learning very well online, 64% of the sample miss traditional classroom education. A similar result was obtained by Gherhes et al. [39], who reported that about 61% of respondents desired a return to face-to-face learning after the end of the pandemic to a large or a very large extent. However, the vast majority of respondents in the current study stated the best solution is to combine elements of online and face-to-face learning in the future. Other studies have reported similar preferences [44], clearly indicating that students associate both forms of education with some advantages (see also: [2,39,40], which they wish to remain in the future. This result is also accordance with Jung [6], who stated that *all students need to become bicultural, internalizing these two cultures of learning: the conventional and the virtual* (p. 22).

Some differences concerning learning preferences were observed between groups of full-time and extramural students. The latter group demonstrated a slightly more positive attitude to online learning, supporting hypothesis 3. Because of time efficiency, online learning is more convenient for extramural students, thus they are more motivated to accept the disadvantages associated with distance education. However, this result can be explained by the fact that extramural students are more active working people in comparison to full-time students [45]. As the result of the COVID-19 lockdown, some of them made the shift to working from home. Therefore, it is supposed that extramural students are more experienced with online tools and platforms. And, as classic studies indicate—the more often people have previously been exposed to a stimulus object, the more they like it (see: the mere exposure effect [46]). Thus, this factor should be considered in future investigations. Nonetheless, result of current study may indicate that extrinsic motivation plays some role in acceptance of online learning (see also: [47]).

Regarding temper traits, only two of the seven taken into consideration, briskness and activity, were significant predictors of positive attitude towards online learning. Both temper traits are positively related (see Table 3; also: [42]). RTT theory states that the higher someone's briskness, the more active they are; however, the current study found both a positive correlation between attitude towards online learning and briskness and a negative correlation between activity and attitude towards online learning. Therefore, two temper traits that are positively intercorrelated demonstrate different associations with the variable positive attitude towards online learning.

Briskness, as a time feature, refers to speed, pace, and mobility of behavior. It is defined as a tendency towards quick-trigger responses and the ability to easily change reactions depending on changes in environment. Briskness is associated with the cognitive functions of alternating attention and speed of the response orientation. Using online platforms require some specific cognitive abilities [48,49], especially when students first had to familiarize themselves with the e-learning systems. So, students with higher levels of briskness can more easily navigate online learning platforms. The perceived ease of use of e-learning systems correlates with the acceptance for e-learning [9,10]; therefore, brisk students demonstrated a more positive attitude to online education.

Activity is a tendency to undertake stimulating behaviors, or behaviors that provide strong external stimulation. It correlates with extraversion [25] and is associated with seeking social stimulation. One consequence of distance learning was a reduction in direct contact with others. As such, students with a low need for social interactions (i.e., those with low activity) can cope with social isolation better than those with a high need for contact with others, and hence their attitude to online learning is more positive. This outcome is partially supported by Rettew et al. (2021; see: introduction) [16] but contradicted by other studies. For example, Rivers [33] found that extraversion was positively linked with a positive attitude toward the use of Moodle (an online learning platform); however, it was also negatively linked with course achievement. Wei [31] observed that introversion was associated with more severe loneliness, anxiety, and depression as a result of COVID-19-related circumstantial changes among students. Other investigations show that the role of extraversion in coping with the COVID-19 situation is ambiguous [16,30–32,34]. However, it must be stressed that the dependent variable in the current study was slightly different from the studied constructs in these investigations, as the construct of activity, although related to extraversion, is not the same. Nonetheless, the findings of this study and other investigations indicate that the relationship between psychological characteristics and positive attitude to online learning is somewhat complicated.

Due to certain limitations of the study, the findings described here need to be interpreted with caution. First, the participants of the investigation were not representative of the general student population (they were students of management and economics programs from a single university in Poland), limiting the generalizability of the findings. Secondly, the cross-sectional design does not allow conclusions about the causality of the studied variables. Hence, future investigations should utilize longitudinal data to ensure the conclusion reflects causation. Furthermore, the reported correlations, although statistically significant, were not strong; thus, they require confirmation from future research.

5. Conclusions

To sum up, the current investigation indicates that students' attitudes towards different modes of education differ depending on how well they fit into two distinct environments: classroom and online learning. Temperament and external motivation may play some role in the development of a positive attitude to online education. However, as it is pilot study and has some limitations, more investigations in this field are needed.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data that support the findings of this study are available from the author upon reasonable request.

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