

# Academic online learning experience during COVID-19 - a systematic literature review based on personality traits

Academic  
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## Abstract

**Purpose** – The purpose of this paper is to provide an overview of the literature regarding the academic online learning experience under the lens of broad personality traits, in the transition from traditional to online learning due to global coronavirus pandemic (COVID-19).

**Design/methodology/approach** – The systematic literature review is based on preferred reporting items for systematic reviews and meta-analyses (PRISMA) method and includes indexed empirical studies in academic institutes during the period of COVID-19 outbreak.

**Findings** – Electronic sources identified 103 references; while after the elimination of duplicates and irrelevant titles, 42 papers were forwarded for abstract screening and later full-text assessment. Of these, 14 met the eligibility criteria. Finally, nine studies were included in the literature review profiling and in the qualitative analysis.

**Originality/value** – The research insights provided in this study are useful in terms of enhancing the view that link broad personality traits and various learning outcomes, during the necessitated transition to online learning by the public health emergency of the COVID-19 pandemic.

**Keywords** Academic performance, Online learning, Big five

**Paper type** Literature review

## Introduction

The coronavirus (COVID-19) pandemic seems to have left its imprint on the planet, bringing about numerous changes, ranging from politics, economy, society, and technology, to everyday life, choices, consumption patterns, interaction, and ways of thinking. The way various activities are conducted has changed, and this shift includes the fields of education and learning. According to the United Nations, “The Covid-19 pandemic has created the largest disruption of education systems in history, affecting nearly 1.6 billion learners in more than 190 countries and all continents. Closures of schools and other learning spaces have impacted 94% of the world’s student population” (United Nations, 2020, p. 2). It is a fact that



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many higher education students who were previously engaged in face-to-face learning forms have unexpectedly been forced to make a sudden and rapid transition to online education. Online education, often known as online learning, eLearning, or web-based learning, is a subset of distance education. While the term “distance education” generally refers to all forms of teaching and learning in which the student and instructor are geographically and temporally separated, the term “online” specifically refers to teaching and learning environments that utilize computer mediated communication (CMC) modalities (Finch and Jacobs, 2012).

While there has been much debate and analysis of the benefits and drawbacks of online learning, research suggests that students typically enjoy taking online courses (Seiver and Troja, 2014). As technology advancement contributes to the facilitation of the communication process in combination with the flexibility it provides, online learning environments are attractive to institutions, instructors, and students (Shearer, 2009). In order to achieve the desired learning outcomes and fulfill the requirements of students, significant attention must be paid to the design and implementation of the course’s content, interactions, reflections, activities, and assessments. However, this is the case under typical circumstances, yet the situation has been exceedingly atypical. Due to the pandemic, most higher education institutes (HEIs) institutes all over the world have shifted from traditional to online learning to continue educational programs while also implementing the social distance rules. In this situation, students had to adapt to the new circumstances without a gradual transition or any prior planning or preparation.

The physical, digital, cultural, or contextual dimensions that determine “where” and “how” educational processes occur constitute learning environments (Steinberger *et al.*, 2021). They are influenced by the actors operating in them, the technology they utilize, their physical layout, their social and cultural surroundings (Whittle *et al.*, 2020), and the pedagogical strategies employed by instructors. Extensive research has been conducted on the transition from traditional face-to-face to online training (Aboagye *et al.*, 2021). Nevertheless, it is essential to differentiate between “planned online learning” and “emergency remote teaching” (Moser *et al.*, 2021; Ng, 2021). In contrast to the former, the latter involves a temporary transition from a face-to-face to an online mode of communication without previous planning or adjustment (Ng, 2021). The COVID-19 epidemic forced the academic world, in particular, to adapt to the “emergency remote teaching” environment (de Jong, 2020; Hodges *et al.*, 2020; Whalen, 2020), or “emergency online education” (Marinoni *et al.*, 2020), providing an exceptional challenge to both learners and educators (Lee *et al.*, 2020).

The pandemic, apart from the imperative necessity of using on-line education, ushered in a new wave of changes in students’ lives. The sense of isolation or loneliness that may accompany physical and social distance, the sense of fear and uncertainty, the need to familiarize themselves with new learning and evaluation methods, and the limited options for discharging feelings of anxiety through socializing with friends and family, are some of the challenges students had to deal with.

Personality is described as the dynamic organization of the physiological, volitional, emotional, and mental dispositions of the individual, and its role is important in the delineation of internalization and the behavioral reaction to situations and environmental stimuli. According to Allport, “Personality is the dynamic organization within the individual of those psycho-physical systems that determine his unique adjustment to his environment” (Allport, 1937, p. 48). The regularities and consistent patterns that characterize a certain individual’s behavioral repertoire are thought to differentiate the individual as a person and make his behavior predictable (Carson, 2019).

Personality traits reflect “dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings, and actions” (Costa and McCrae, 1990, p. 29). These

traits shape a person's patterns of behavior, thoughts, and feelings, as well as the psychological structures that regulate such patterns (Jani, 2014; Bhagat *et al.*, 2019), while they remain relatively consistent throughout time, cultures, and settings. The propensity of a person to behave in a specific way or to successfully engage with others is a function of his or her personality (Hogan, 1991). According to the five factors model (FFM), most personality traits studied by psychologists and used by individuals to describe themselves and others can be adequately represented by five major dimensions: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism.

Openness to Experience assesses curiosity, imagination, and divergent thinking. An individual's openness to experience is manifested by qualities of being creative, artistic, intellectual, deep, and insightful (John and Srivastava, 1999; Jani, 2014). Conscientiousness assesses planfulness, persistence, and goal-directed behavior. It refers to the efficiency, precision, persistence, organizational skills, coordination, and industriousness of a person (Jani, 2014). Extraversion assesses sociability, enthusiasm, and pleasurable arousal. Extraverts tend to be optimistic, adventurous, talkative, vigorous, assertive, and active (Costa and McCrae, 1990). Agreeableness assesses kindness, cooperativeness, and consideration. It portrays how an individual gets along with others, with sub-dimensions like being warm, empathetic, generous, and moral. Neuroticism being the opposite of emotional stability reflects high levels of anxiety and depressed mood as well as lower levels of self-esteem.

Conscientiousness is the personality characteristic having the most constant and robust relationship with academic success among the five components of the FFM (Poropat, 2009; Richardson *et al.*, 2012; Vedel, 2014). These correlations have been observed across all levels of education, even after adjusting for other important characteristics such as intelligence. While the precise process through which Conscientiousness is connected with academic success is unclear, various alternative explanations have been proposed. Conscientiousness is strongly related to an effortful control temperament feature, which is involved in self-regulation and plays a key role in the ability to consciously suppress activities as well as direct and sustain attention on tasks (Abe, 2005, 2020; Rothbart, 2007). In the academic context, conscientious students have been found to exhibit strong achievement motivation (Richardson and Abraham, 2009) and to apply self-regulatory learning mechanisms as well as adaptive coping strategies (Saklofske *et al.*, 2012).

Alongside Conscientiousness, the personality dimension most likely to be related to academic achievement is Openness to Experience (Vedel and Poropat, 2017). Individuals with high scores on this personality factor are naturally driven to seek out intellectually stimulating activities as well as novel experiences, which are considered to contribute to cognitive progress and knowledge accumulation (von Stumm *et al.*, 2011). Such students also have a deep learning approach (Chamorro-Premuzic and Furnham, 2009), as well as reflective learning styles and learning methods, including elaborative processing and critical thinking. Furthermore, openness is the FFM factor most significantly related to learning goal orientation (Payne *et al.*, 2007). Thus, openness is one of the "intellectual investment traits" that, along with effort and ability, are regarded to comprise one of the three pillars of academic performance (Abe, 2005; von Stumm *et al.*, 2011).

Agreeableness shows positive correlations with academic achievement (Poropat, 2009; Richardson *et al.*, 2012), but these correlations are moderate unless in primary education. Extrinsic types of academic motivation are associated with agreeableness, which means that more agreeable individuals tend to choose to identify with and integrate socially accepted values, resulting in valuing academic performance since it is the socially accepted value in educational settings (Komarraju *et al.*, 2009). More agreeable students spend more time on homework and procrastinate less (Lubbers *et al.*, 2010), employing more self-regulatory learning strategies such as time management, effort regulation, elaborative processing, and

fact retention (Bidjerano and Dai, 2007; Komarraju *et al.*, 2011). These behavioral and motivational factors help explain why agreeableness has a positive, but not strong, link to academic success (Abe, 2005, 2020).

Extraverted students are more academically motivated and have a higher learning goal orientation (Payne *et al.*, 2007), but they are also motivated to socialize with friends, engage in groups and activities, and explore the social experience (Bernard, 2010). This sociability-induced distractibility may explain why the relationship between extraversion and academic achievement is weaker at higher education levels, when students are increasingly responsible for their own learning (Vedel and Poropat, 2017). Extraversion, on the other hand, has been consistently connected with a variety of learning-relevant characteristics. It is suggested that more extraverted people have greater subjective well-being, such as positive affect and quality of life, most likely because the aspect of extraversion facilitates the generation of pleasant life experiences (Steel *et al.*, 2008). Extraverted people's friendliness, assertiveness, and active involvement in the social environment may be useful for learning, which entails frequent interactions with teachers or peers (Abe, 2005). Overall, there are only minor correlations between extraversion and academic performance (Poropat, 2009; Richardson *et al.*, 2012).

Steel *et al.* (2008) found that emotional stability is a strong predictor of subjective well-being. This is because emotional stability means feeling, thinking, and acting in a calm and peaceful way. Emotional stability is also linked to performance self-efficacy (Judge *et al.*, 2002), which is substantially related to higher education achievement (Richardson *et al.*, 2012). Given this, one may assume emotional stability to be reflected in entirely positive motives and outcomes in academics. The association between emotional stability and academic success, on the other hand, has been shown to be more complicated (Vedel and Poropat, 2017). More emotionally stable individuals, displaying this complexity, are more likely to willfully place more emphasis on and learn from errors, as well as employ learning styles such as analyzing, organizing, and integrating new material with previous knowledge (Lubbers *et al.*, 2010; Komarraju *et al.*, 2011). However, emotional stability is linked to a lower likelihood of using a rehearsing strategy, and more emotionally stable students devote less time to homework (Bidjerano and Dai, 2007; Lubbers *et al.*, 2010). Low levels of emotional stability are linked to academic apathy, crippling anxiety, withdrawing, and feeling disillusioned about education, but also with a focus on getting the highest grades (Komarraju and Karau, 2005; Komarraju *et al.*, 2009).

In comparison to the large body of research on the relationships between personality traits and academic success in traditional face-to-face education, there is a considerably smaller body of research on the personality features of students who function effectively in online classes. Conscientiousness and Openness to Experience were shown to relate to favorable impressions of and satisfaction with online learning experiences (Keller and Karau, 2013; Cohen and Baruth, 2017). While personality traits and self-efficacy beliefs address different structures and processes and operate at different levels, they are thought to be important in accounting for higher education achievement as well as many other outcomes (Caprara *et al.*, 2011). Some studies have employed characteristics such as self-efficacy, goal-oriented motivations, and affective processes to assess student performance in an academic context (Chemers *et al.*, 2001). The relationship between undergraduate students' personality characteristics and a web-based environment was examined (Schniederjans and Kim, 2005) and the results showed that four out of five characteristics (e.g. conscientiousness, openness to experience, emotional stability, and agreeableness) were correlated with student achievement scores. According to research, the reasons people engage in actions have a significant impact on whether such behaviors are adaptive. Self-determination theory defines a range of motivational types based on their perceived locus of causality, which ranges from strongly external to strongly internal. Individuals are assumed to engage in activities for a variety of reasons, ranging from more controlled (because they have to) to more autonomous

(because they want to) (Ryan and Deci, 2017). Personality traits such as innovativeness and a willingness to experiment are critical when it comes to adjusting to Internet technology (Wu and Ke, 2015). Integrating research on personality characteristics is crucial for expanding our understanding of successful online learning because, in the absence of face-to-face contacts, online conversations and interactions become the key component of the overall educational experience (Kovanović *et al.*, 2016).

Even though the process of digital transformation in higher education began years ago, the epidemic has hastened it, resulting in major changes within a matter of weeks. As most HEIs acknowledge, this technological transformation of education necessitates substantial changes in teaching methodology, key competencies, and assessment techniques. Universities must transition from a predominantly “lecture-based learning” system to “problem-based learning” methodologies that engage students more actively in a virtual setting (Marinoni *et al.*, 2020). This transition from “in-person” to virtual education will have substantial ramifications for the entire learning process, requiring a reevaluation of the skills and abilities expected of students in this new setting as well as extensive modification of assessment methodologies for learning outcomes (García-Morales *et al.*, 2021).

Personality traits and other circumstances, such as the physical distance caused by the COVID-19 pandemic, determine the learning environments of students. Personality theory encompasses ideas, feelings, and actions. Thus, research differentiates between people and predicts, with varying degrees of accuracy, their future thoughts, emotions, and behaviors (Steinberger *et al.*, 2021). In recent years, many studies have focused on the aforementioned topics. Despite the challenges, and the fact that they faced several distinct obstacles that were unique to them, students must endeavor to retain their concentration on learning. Students’ learning and successes are often highlighted by their objectives and goal orientations, but it is difficult to maintain a focus on achieving goals when life difficulties have taken precedence (Besser *et al.*, 2020). All these variables affect academic achievement (Nguyen *et al.*, 2015): students’ knowledge motivation, active participation, attitudes toward the knowledge imparted, and course delivery approach. In addition, research studies have distinguished between “traditional face-to-face”, “planned online environments”, and “emergency remote teaching”, each of which influences the learning levels of students differently (Ebner and Gegenfurtner, 2019).

Given the impact of the emerging coronavirus pandemic on the educational ecosystem and the growing reliance on online learning solutions and technologies, the goal of this study was to do a systematic review of how higher education students respond to changes in the academic learning environment brought by the pandemic and the need to engage in social distancing, as well as the importance of individual differences through the lens of broad personality traits.

## Methods

A systematic review of the literature published after the COVID-19 outbreak involving students’ experiences and the transition to online learning was carried out. The research began in September 2021 and ended in February 2022. The first step was to establish the criteria for the selection of articles to be included in the review as well as the exclusion criteria. In line with the purpose of the review, the relevant studies concerned higher education institutes that had to move to emergency remote teaching in the COVID-19 pandemic. In particular, the studies focused on those cases where students were typically engaged in face-to-face learning formats before the transition. The goal was to evaluate the relevance of individual differences and broad personality traits in learning experiences and outcomes in response to the disruption created by the pandemic. This review aims to increase further understanding and offer an insight into how these individual differences factors are related to affective, cognitive, and behavioral reactions to the new learning environment as expressed by the students.

The inclusion and exclusion criteria are described in [Table 1](#).

The next step was to define the databases in which to carry out the search. A comprehensive search was conducted throughout the Google Scholar, PubMed, ScienceDirect, Base, ProQuest, and EBSCO databases in order to find relevant publications. Three essential concepts were identified for the search strategy: “personality traits,” “outcomes, mediators, and learning experiences,” and “online education.” These words were expanded to include synonyms, alternative spellings, and similar terms. Nonetheless, each database has its own unique set of indexed topic headings, so a tailored keyword combination for each thesaurus was implemented.

The search was conducted following the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), including the PICO strategy: participants (e.g. undergraduate, postgraduate students), intervention (e.g. online education; type of research: quantitative, qualitative, or mixed); comparators (e.g. traditional face-to-face education); and outcomes (e.g. affective, cognitive, behavioral). In order to be included in the review, all references were assessed based on the inclusion/exclusion criteria described in [Table 1](#). All retrieved articles were exported to a reference manager for selection procedures. This stage was divided into three phases, each of which was carried out independently by two authors. Duplicates and irrelevant titles were removed in phase one. In phase two, the remaining papers’ abstracts were reviewed using the inclusion/exclusion criteria. In cases where information in the article abstract was found insufficient, the article was moved to phase three, where it could be evaluated based on the entire text rather than the abstract. The whole text of each article was evaluated in step three, allowing for a final judgment.

The articles were analyzed individually and in depth by the researchers with the aim of carrying out the whole process in parallel to minimize bias around the application of the exclusion criteria and the selection of articles. The criteria for assessing the quality of the selected studies were based on the Checklist for Measuring Study Quality (e.g. is the hypothesis/objectives/findings of the study clearly described?; [Downs and Black, 1998](#)), the Strengthening the Reporting of Observational Studies Statement (e.g. is it possible to use the design in other studies?; [Von Elm et al., 2008](#)). Analyses of the measures of effect were not performed, due to methodological heterogeneity and the results of the systematic review are presented as a qualitative narrative synthesis.

## Results

Electronic sources identified 103 references, while after the elimination of duplicates and irrelevant titles, 42 papers were forwarded for abstract screening and later full-text assessment. Of these, 14 met the eligibility criteria. Finally, 9 papers were rated as of good

Inclusion criteria	Exclusion criteria
Empirical studies based on personality traits focusing on outcomes of online education	Editorials, opinions, books, viewpoints and other not empirical studies
Studies that report research on undergraduate or postgraduate students in academic institutes	Studies on populations other than academic institutes
Articles available in English and Greek language	Studies published in other than Greek and English language
Studies published after the COVID-19 outbreak	Studies that involve research implemented before the transition to online education
Studies that report research on institutes focused on traditional face to face learning before the pandemic outbreak	Studies not focused on personality perspectives and not considering variables of online education experience

**Table 1.**  
Setting the scope:  
inclusion and  
exclusion criteria

quality evidence and were included in the review. Figure 1 presents a flow diagram summarizing the review process. All selected studies stated clear objectives and were found to be relevant for the study of personality effects and relations with online education during the COVID-19 pandemic.

The unit of analysis was centered on identifying and establishing links between personality factors and educational outcomes. The theme analysis was divided into two stages. The first was an open coding stage aimed primarily at extracting the fundamental concepts and resulting in segment grouping into the five distinct personality traits. The second phase was an interpretive step in which conclusions were drawn and reflections were made on the results.

Table 2 was developed with the 9 final articles selected after a thorough and systematic review process, where each one was described based on the following categories: (1) Author, year of publication, and country: this field includes information about the research's

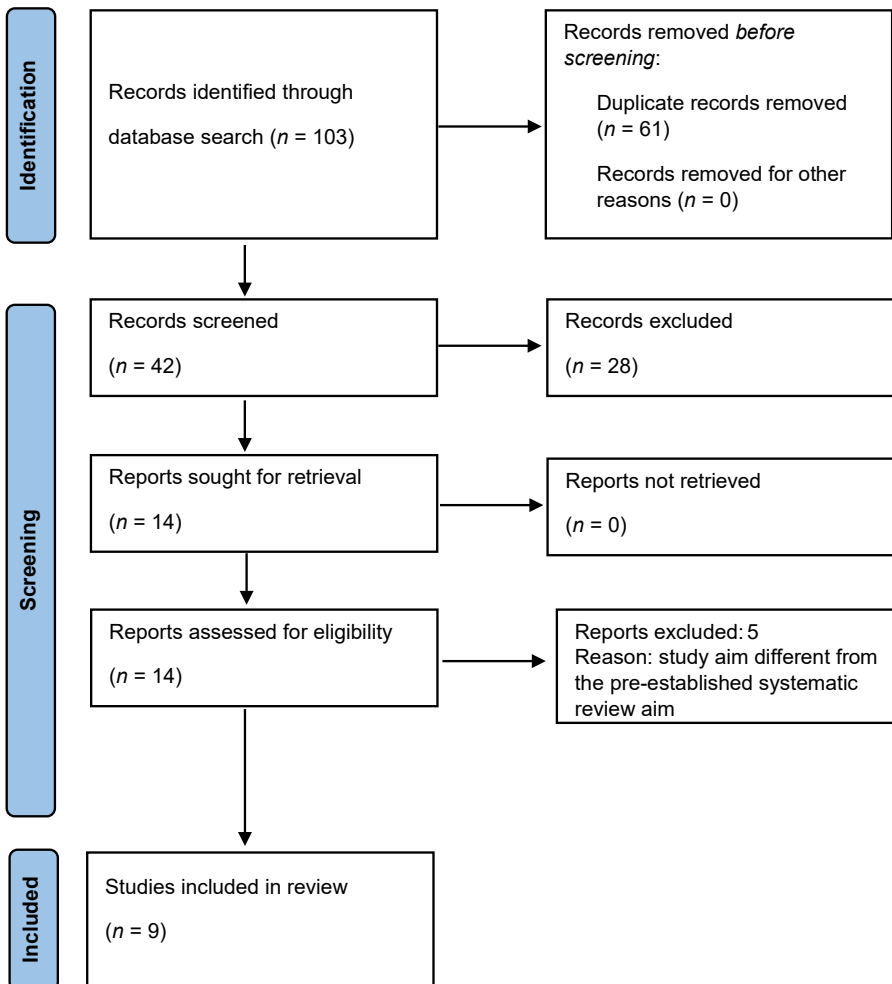


Figure 1.  
Prisma flow diagram of  
the review process

authorship and distribution in the country where it was conducted; (2) Sector: describes the department or field of education where the study was carried out; (3) Sample: this category includes the number of participants, age, gender, and level of education, which provides information on the variability of the sample used, both in terms of the number of participants and gender, as well as the level of education (undergraduate or postgraduate); (4) Data collection instruments: the primary instruments used to determine factor measurement; (5) Research and data analysis methods: whether quantitative, qualitative, or mixed methods were used in the study; study design classification, as well as the main statistical methods; (6) Results: the main results are presented in a structured way, divided by the five factors of personality (Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism), with a column containing the results relating to other factors studied.

Except for two studies released in 2020, the majority of the studies were published in 2021. Two out of the nine studies were conducted in Greece, while the others were distributed geographically. Hong Kong, Japan, Germany, China, Pakistan, Canada, and Israel are among the countries represented in this review. The fields of study of the participants are listed in 5 of the 9 cases and appear to differ. Thus, all students come from various departments such as management, law, languages, biology, social sciences, economics, and information science. The number of the sample varies among the research analyzed, as the participant number ranges from 110 (Vlachogianni and Tselios, 2022) to 1,152 students (Besser *et al.*, 2020). The gender distribution of the sample varies from case to case. Nevertheless, with the exception of Rivers (2021), a study where males prevailed in the sample, and one study, which does not disclose the gender distribution, females represented the majority of participants in the remaining 7 studies. The level of the studies is mainly undergraduate (5 out of 9 studies), while in 3 studies both undergraduate and postgraduate students were investigated, and in one case, the level of studies is not mentioned. Therefore, the average age in each study is under 25 years old, apart from the Besser *et al.* (2020) study, where the mean age is 27.42 years due to the specificity of the case in which, after school graduation, certain years of military training and work follow, as noted.

With regards to the study of personality, the majority of studies tend to utilize questionnaire surveys that focus on the analysis of personality traits through the prism of the five factors model. It was only in the study of Zheng *et al.* (2020) that proactive personality was explored on the basis of social capital through Internet self-efficacy and online interaction quality. Scales based on previous studies were adapted and modified for the COVID-19 period in terms of the instruments used for access to online learning experience, academic achievement, and other relevant factors.

In parallel with personality, other theoretical frameworks or notions were studied, such as adaptability, motivation, self-efficacy, engagement, anxiety, well-being, satisfaction, regulation, in order to explore any relationships that will lead to an in-depth analysis and broader perspective of the on-line academic experience in the pandemic period.

All studies used quantitative methods, while one study used a mixed method (Yu, 2021). Additionally, 7 out of 9 were cross sectional studies, while one used the time lag method (Zheng *et al.*, 2020) and one a longitudinal design (Audet *et al.*, 2021), in which the observations of students were examined at the beginning and at the end of the academic semester. Also, in 3 studies, the attitude or the perceived usability and actual use of the online platforms were explored along with personality traits. Beyond correlation and regression analysis, path analysis was used through structural equation models to explore direct and indirect effects through mediation, moderation, as well as mediation moderation models.

In their study, Tavitiyaman *et al.* (2021) found that the level of students' agreeableness had a positive influence on their learning, technical, and financial anxieties, meaning that the higher the level of agreeableness, the higher the students' perceived anxieties. As Yu (2021) noted, agreeableness contributed significantly to the regression model for the learning outcomes.

Author(s) year, country	Sector	Sample	Data collection instruments	Data analysis method, type of study	Openness	Conscientiousness	Agreeableness	Extraversion	Neuroticism	Other selected findings
<b>Tavitiyaman et al. (2021)</b> Hong Kong	Management (hospitality, tourism and Event)	283 undergraduate students (3rd, 4th year) 21.6% males 78.4% females age 17–19 11.1%, 20–22 69.6% 23–25 26.8% 26-above 25%	Research instruments developed based on previous studies Platform not mentioned	Quantitative cross sectional SEM path analysis	↔ learning anxiety: + ↔ technical anxiety: + ↔ financial anxiety: +	↔ learning anxiety: – ↔ technical anxiety: – ↔ financial anxiety: – ↔ perceived online learning: + ↔ learning outcomes: +	↔ learning anxiety: + ↔ technical anxiety: + ↔ financial anxiety: +	↔ technical anxiety: + ↔ financial anxiety: +	↔ financial anxiety: –	learning anxiety ↔ perceived online learning: + financial anxiety ↔ perceived online learning: + perceived online learning ↔ satisfaction: +
<b>Yu (2021)</b> China	Languages	1,152 students 553 undergraduates 599 postgraduates 595 females 557 males age 18–25	Big five scale (BFS) ( <b>McCrae and Costa, 1995</b> ) Six dimensions, scale to determine online learning outcomes Platform BLCU MOOC's and Superstar learning system(for mobile devices)	Mixed design Cross sectional correlation, regression analysis	↔ learning outcomes: +	↔ learning outcomes: +	↔ learning outcomes: +	↔ learning outcomes: –	↔ learning outcomes n.s.	No gender differences regarding learning outcomes Educational level ↔ learning outcomes: – (undergraduates preferred traditional method, postgraduates online learning)
<b>Rivers (2021)</b> Japan	Information science	149 undergraduate students 119 males (79.8% males 30 (20.2%) females mean age 19.4	Moodle Ten item personality inventory (TIPI) Items from otivated strategies for learning questionnaire (MSLQ) and technology acceptance model (TAM)	Quantitative SEM path analysis	↔ and ↔ acceptance, attitude, actual use of Moodle: n.s. ↔ and → online academic self- efficacy: n.s. ↔ and → course achievement: n.s.	↔ online academic self- efficacy: + ↔ acceptance of actual Moodle use: + ↔ course achievement: +	↔ online academic self- efficacy: + ↔ acceptance of actual Moodle use: + ↔ course achievement: +	↔ attitude toward Moodle: + ↔ course achievement: – ↔ acceptance of Moodle: n.s.	↔ and ↔ acceptance, attitude, actual use of Moodle: n.s. ↔ and → online academic self- efficacy: n.s. ↔ and → course achievement: n.s.	Online academic self- efficacy → course achievement: + Perceived ease of use ↔ actual use of Moodle ↔ course achievement: + Online academic self- efficacy ↔ actual use of Moodle: + Attitude toward Moodle ↔ and → actual use of Moodle: n.s.

(continued)

**Table 2.**  
Summary of key study  
characteristics

Table 2.

Author(s) year, country	Sector	Sample	Data collection instruments	Data analysis method, type of study	Openness	Conscientiousness	Agreeableness	Extraversion	Neuroticism	Other selected findings
Besser, Platt Hill, (2021) Israel	36.6% social sciences 21.8% sciences, 5.7% art, 3.7% law, 4.6% humanities, 27.7% management studies	1,217 undergraduate students 945 females(77.6%) 272 males (22.4%), Mean age 27.42(3 years in the military beginning at 19 years of age, followed by a year of work, 6 months traveling for the big travel)	Modified version of the adaptability scale, Big-five mini- markers instrument	Quantitative cross sectional regression, SEM path analysis	↷adaptability: + ↷learning experience:+	↷adaptability: + ↷learning experience:+	↷adaptability: + ↷learning experience:+	↷adaptability: + ↷learning experience:+	↷adaptability: - ↷learning experience:-	stress, isolation, negative mood ↔ synchronous online learning experience: + (compared to traditional face-to- face, learning) positive mood concentration, motivation performance↔ online learning experience: - belongingness and mattering ↔positive experiences in synchronous online learning: + antimattering↔ negative experiences: + adaptability ↔ significant unique variance across all measures Perceived usability → learning gain: +
Vlachogianni and Tselios (2022) Greece	Ø	110 undergraduate students 96 females and 14 males M = 19.65	Big 5 personality test, perceived usability of Zoom platform and learning gain questionnaire on the basis of previous studies	Quantitative cross sectional Hierarchical linear regression	↷learning gain: n.s	↷learning gain: n.s	↷learning gain: n.s	↷learning gain: n.s	↷learning gain: n.s	

(continued)

(continued)

Author(s) year, country	Sector	Sample	Data collection instruments	Data analysis method, type of study	Openness	Conscientiousness	Agreeableness	Extraversion	Neuroticism	Other selected findings
Zheng <i>et al.</i> (2020) Pakistan	Business administration economics, computer science, and law from six universities	332 students 166 undergraduates 166 postgraduates 223 67.17% females 109 32.83% males Up to 20 1.81% Age 21–25 37.35% 26–31 29.22% 31 above 31.6%	Modified version of the self-reported 10 items proactive personality scale) Internet self-efficacy scale Cognitive presence scale odified perceived social support scale) Internet-based social capital, ten- item scale based on previous studies	Quantitative time lag Matched student- teacher data Hierarchical multiple regression, mediation moderation analysis	∅	∅	∅	∅	∅	Proactive personality → Internet self-efficacy: + proactive personality → social capital: + (mediated through online interaction) proactive personality → Internet self-efficacy: + (moderated by perceived social support) proactive personality → online interaction quality: + (moderated by perceived social support) proactive personality → social capital: + (perceived social support moderates the mediating effect of online interaction quality)
Audet <i>et al.</i> (2021) Canada	∅	350 undergraduate students 87.8% female Mean age 19.75	Subjective well- being (SWB) SWB The satisfaction with life scale (SWLS; Diener <i>et al.</i> 1985) Big five inventory (BFI) motivation using a 5-item scale, engagement in online classes self- efficacy, based on previous studies	Quantitative longitudinal Correlational, regression Multiple regression analysis	→ self-efficacy: + → controlled motivation: – → identified motivation: + → subjective well- being: n.s	→ self-efficacy: + → controlled motivation: – → identified motivation: + → subjective well- being: n.s	→ self-efficacy: well-being: n.s → self-efficacy: n.s → controlled, intrinsic identified motivation: n.s	→ subjective well-being: n.s → self-efficacy: n.s → controlled, intrinsic identified motivation: n.s	→ self-efficacy: - → controlled motivation: +	

Table 2.

Table 2.

Author(s) year, country	Sector	Sample	Data collection instruments	Data analysis method, type of study	Openness	Conscientiousness	Agreeableness	Extraversion	Neuroticism	Other selected findings
Staller <i>et al.</i> (2021) Germany	Biology	228 undergraduate and postgraduate students Age range 18–43 years Mean age 23.36 75% female	Personality based on the BF144 short Morningness- eveningness questionnaire (MEO) Subjective italy scale motivational regulation, satisfaction and frustration, self- efficacy questionnaire, based on previous studies	Quantitative correlation, multiple regression analysis	→self-efficacy: + →Need satisfaction competence: + →Intrinsic regulation: + →Identified regulation: + →Need satisfaction competence: + →Intrinsic regulation: +	→self-efficacy: + →vitality: + →Identified regulation: + →Need satisfaction competence: + →Introjected avoidance regulation: –	→self-efficacy: n.s →vitality: n.s →need satisfaction competencens	→intrinsic motivation: – →self-efficacy: n.s →vitality: n.s →need satisfaction competencens	→self-efficacy: – →vitality: – →need satisfaction competence: – →introjected approach regulation: + →avoidance motivational regulation: + need frustration competence: + ↔Need relatedness: + →online learning satisfaction: –	gender ↔motivational aspects (Males reporting a higher degree of self-efficacy and women being more intrinsically motivated) Age ↔introjected avoidance regulation: –
Sahinidis <i>et al.</i> (2020) Greece	Ø	555 students 326 (59%) females 229 (41%) males Age: Ø Student level: Ø	Big five personality modified based on previous studies	Quantitative multiple regression analysis	→online learning satisfaction: +	→online learning satisfaction: +	→online learning satisfaction: n.s	→online learning satisfaction: n.s	→online learning satisfaction: –	

Rivers (2021), found that agreeableness had a direct positive effect on online academic self-efficacy beliefs in addition to the indirect positive effects on perceived ease of use, perceived usefulness, attitudes toward Moodle, and online course achievement outcomes. In Besser *et al.*'s (2020) study, it was demonstrated that students who reported higher levels of adaptability, also had higher levels of agreeableness. According to Vlachogianni and Tselios (2022), who studied the usability and students' personality traits on their learning gains in an e-learning context, agreeableness was the only personality trait that had a statistically significant impact on learning gain.

Students with high levels of openness demonstrated higher learning, technical, and financial anxieties in Tavitiyaman *et al.* (2021) study. Openness to new experiences contributed significantly to the regression model for learning outcomes in Yu (2021), while it revealed a non-significant effect on academic achievement in Rivers' (2021) study. In Sahinidis *et al.* (2020) research, openness showed a positive relationship with student satisfaction. According to Besser *et al.* (2020) openness accounted for significant unique variance in levels of adaptability. As stated by Audet *et al.* (2021), who employed a self-determination theory framework for evaluating how university students responded to online classes that were suddenly imposed due to the COVID-19 pandemic, new experiences were shown to be associated with intrinsic motivation and subjective well-being. Intrinsic motivation refers to undertaking an activity for the sake of doing it because it is naturally joyful and intriguing (Ryan and Deci, 2017). Because openness to experiences is associated with being more open to innovative techniques and experiences (McAdams, 2015), and as intrinsically motivated individuals connect with their environments in a curious manner, they may be more interested in the novel methods of online learning. As a result, because they are more intrinsically driven, openness to experience may ease the transition and adjustment to the new circumstances (Audet *et al.*, 2021). As demonstrated by Staller *et al.* (2021), openness to experiences yields a positive correlation with self-efficacy. Furthermore, in line with the previous study, it was related to the self-determined types of motivational regulation. They attribute a plausible explanation to students with a more "open" personality; they may confront more demanding and unpleasant situations, allowing them to feel greater self-efficacy than students with a more "reserved" personality.

Extraverted students prefer face-to-face contacts over online interactions and spend less time on the Internet (Landers and Lounsbury, 2006), resulting in high levels of technical and financial anxiety, as was found in Tavitiyaman *et al.* (2021) study. Rivers (2021), observed a direct negative effect on course achievement. So did the study by Yu (2021). Interestingly, Besser *et al.* (2020) observed an indirect positive effect of extraversion on learning experience through adaptability. Staller *et al.* (2021), however, saw a negative relation between extraversion and intrinsic motivational regulation, while in the other studies, no significant associations between extraversion and learning gain, self-efficacy, or learning satisfaction were found.

Conscientiousness was a dominant trait in terms of direct and indirect effects examined in Rivers (2021) study, as this personality trait had a direct positive effect on online academic self-efficacy beliefs as well as an indirect positive effect on the perceived ease of use, the perceived usefulness, attitudes toward the Moodle platform and online course achievement outcomes. These results are in line with Yu's (2021), who observed a positive relation between conscientiousness and learning outcomes. Conscientiousness was associated with high levels of self-efficacy and low levels of controlled motivation in the study of Audet *et al.* (2021), and showed a strong positive correlation with self-efficacy, vitality, and identified motivational regulation according to Staller *et al.* (2021) research. A robust association was demonstrated with adaptability in Besser *et al.* (2020), while there was a positive relation with online learning satisfaction and a negative association with anxiety in Sahinidis *et al.* (2020) and Yu (2021), respectively.

Students with a high level of neuroticism tend not to be financially anxious. As high neuroticism students spent more time on online information searching and studying, they perceived low financial anxiety in return for the time spent on online learning, as stated in Yu's study (2020). Students who reported higher levels of adaptability also had lower levels of neuroticism, as demonstrated in [Besser et al. \(2020\)](#) research. According to [Audet et al. \(2021\)](#), Neuroticism was associated with an increase in controlled motivation, which is consistent with earlier studies showing that neuroticism negatively correlated with autonomous motivation. Controlled motivation has also been linked to school anxiety ([Ryan and Connell, 1989](#)). As a result, its association with neuroticism is unsurprising, especially in the unsettling environment of online classrooms. Most notably, the motivating outcomes were discovered at both the beginning and completion of the online semester. Students who were low on neuroticism or high on conscientiousness or openness to experience were more likely to report higher self-efficacy ([Audet et al., 2021](#)). Finally, neuroticism related negatively to self-efficacy, vitality, and need satisfaction competence while it related positively to introjected approach and avoidance motivational regulation, as well as need frustration competence and relatedness, as demonstrated in the study of [Staller et al. \(2021\)](#).

### Discussion

Individuals that score high on the conscientiousness trait can plan, organize time and materials, and perform ([Jensen, 2015](#)). Conscientiousness is strongly associated with: accuracy ([Di Fabio and Busoni, 2007](#); [MacCann et al., 2009](#)); effort and perseverance ([Paunonen and Ashton, 2001](#); [Di Fabio and Busoni, 2007](#)); being able to devote the appropriate amount of time at the right moment ([Bidjerano and Dai, 2007](#); [Komarraju et al., 2009](#); [Komarraju and Nadler, 2013](#)); learning goals ([Steinmayr et al., 2011](#)), internal and external motivation ([Komarraju et al., 2009](#)); self-efficacy ([Komarraju et al., 2009](#); [Credé and Phillips, 2011](#); [De Feyter et al., 2012](#)); determination ([Peterson et al., 2006](#)); ability to perform ([Paunonen and Ashton, 2001](#)).

The stronger effect of conscientiousness on these variables points to its dominant position as the most consistent predictor of academic achievement ([Kappe and van der Flier, 2012](#)), and as a trait that correlates with higher levels of self-efficacy beliefs ([Lee and Klein, 2002](#)) and more effective learning styles ([Duff et al., 2004](#)). The requirement for efficient self-regulation is heavily emphasized in the online learning environment. The study of [Besser et al. \(2020\)](#), focused on the relationship between adaptability and ratings of online learning after controlling for retrospective reports of those same experiences in face-to-face classroom settings. Associations with all five factors of personality were significant. While adjusting for perspectives of previous experiences, all of the links between adaptability and pandemic-related learning events remained. Higher degrees of adaptability appeared to be benefiting students well in terms of their most recent learning experiences. Also, conscientiousness was shown to be related to identified motivation ([Audet et al., 2021](#)), which is especially important in tasks that require perseverance, such as academic performance and online learning environments, especially during the emergency learning COVID-19 period, which appeared to be less structured than traditional classroom settings. Even under the sudden transition and with less supervision, individuals with greater levels of conscientiousness seem to be able to act in a more goal-oriented and ordered manner.

The findings of openness need to be highlighted since it would be reasonable to presume that openness to new experiences would result in a greater tolerance for uncertainty, which may lead to more favorable reactions to synchronous online learning ([Besser et al., 2020](#)). The pattern of openness to new experiences results, which showed a non-significant association with learning gain and achievement in some cases ([Rivers, 2021](#); [Vlachogianni and Tselios,](#)

2022), or a weak influence on learning variables (Besser *et al.*, 2020), reflects the complexities of openness and the dependence on how openness is measured as well as the outcome that is examined. However, among the five traits, only openness to experience was related to intrinsic motivation as revealed in Audet *et al.* (2021). Individuals that score highly on the openness trait also perform highly on creative assessments (Furnham, 2008; Hirsh and Peterson, 2008; Sawyer, 2012), are strong at problem solving, critical thinking, elaborative thinking, and have a high metacognitive ability (Bidjerano and Dai, 2007; Komaraju *et al.*, 2011), and demonstrate great degrees of autonomy and independence (Costa and McCrae, 1992). While these abilities, and thus openness, are not always and strongly related to academic achievement, they are related to broad general knowledge and everyday life situations. It may be the case that high-openness individuals take their starting points from inner learning goals, motivation, and a deep approach to learning (Jensen, 2015), which is probably more evident when viewed in relation to other variables, or in combination with potential moderators.

It is argued that students who score high on extraversion have more energy and a positive attitude, which leads to a drive to study and learn (De Raad and Schouwenburg, 1996). Extraversion improves performance by enhancing social activities such as peer learning (Bidjerano and Dai, 2007). However, extraverts perform poorly in introspective problem solving (Poropat, 2009). On the other hand, the same students are more prone to socialize and engage in other activities rather than study, resulting in lower levels of performance (Eysenck, 1992; Chamorro-Premuzic and Furnham, 2009). Empirical research has shown conflicting findings, indicating favorable (Hair and Graziano, 2003; Lounsbury *et al.*, 2005), negative (Bratko *et al.*, 2006; Furnham and Monsen, 2009), or no impacts (John *et al.*, 1994; Di Fabio and Busoni, 2007; Poropat, 2009). Thus, the effects of Extraversion appear to be dependent on how the learning environment is organized (Eysenck and Eysenck, 1985). Extraversion in this review showed non-significant effects (Audet *et al.*, 2021; Vlachogianni and Tselios, 2022), but also direct negative effects (Rivers, 2021; Staller *et al.*, 2021; Yu, 2021) and an indirect positive link with learning experience through adaptability (Besser *et al.*, 2020). The latter is also a starting point for further consideration, given the logical assumption that extraverts will suffer more as a result of the pandemic's social isolation regulations. This is still plausible for a fraction of these individuals, but it should be lessened for extraverted students with greater degrees of adaptability (Besser *et al.*, 2020).

Academic learning, as a major component of education, is essentially a broad process of information processing involving observation, attention, memory, and reasoning (Lindsay and Norman, 1972). This process can be thought of as a chain of mental events that begins with the stimulation of some subject matter and ends with the reproduction or application of some examination behavior. Because they interact with-or moderate-successful phases of the information processing sequence, non-cognitive personality traits may emerge as moderators of the overall learning process. Motivational factors may moderate the impact of stimulus material; persistence-like factors may moderate the preservation of selective attention; and intelligence and cognitive style may mitigate the efficacy of the information processing stage. In turn, the influence of personality traits on learning and education may be moderated by task context characteristics (De Raad and Schouwenburg, 1996). As a better grasp of how personality affects various aspects is developed, new insights into the most important processes are gained. Furthermore, it is critical to recognize that by focusing on those processes, change may be able to enhance people's lives without directly affecting the personality traits that drive those processes (Rapee *et al.*, 2005). In any preventative or intervention efforts, it will be critical to consider the potential that most personality traits might have different impacts, depending on the

outcomes in issue, the existence of other psychological features, and the environmental context (Shiner, 2005; Caspi and Shiner, 2007; Roberts *et al.*, 2007).

### Conclusions and implications

Global higher education is undergoing a significant digital transformation as a result of the realities of the new normal being disrupted by COVID pandemic effects (Dwivedi *et al.*, 2020). Academics and students have been thrust into “unfamiliar terrain” because of the sudden forced closure of face-to-face teaching and the need to quickly adapt to total e-learning settings (Carolan *et al.*, 2020). In a context of digital transformation, disruptive technological innovation, and rapid change in the educational framework, universities must be able to provide a quality education (García-Morales *et al.*, 2021). COVID-19’s disruptive effects have not only created opportunities for transforming HEIs, but also difficulties and challenges in this process, as universities must rethink and redesign their educational offerings in response to the new situation (Carolan *et al.*, 2020).

This pandemic can serve as an opportunity for emergency remote teaching to evaluate challenges during crisis situations and build a holistic online education strategy for future emergencies and natural disasters. The work of UNESCO in this field is rooted in the Global Education 2030 Agenda, which aims to “develop education systems that are more resilient and responsive in the face of conflict, social unrest and natural hazards – and to ensure that education is maintained during emergency, conflict and post-conflict situations”. Furthermore, one of the goals is to provide a quality education that aims for the learner “to be able to recognize the intrinsic value of education and to analyze and identify their own learning needs in their personal development” (UNESCO, 2020, p. 18).

Depending on how “success” is defined from the perspective of a given stakeholder, the success of distance and online learning experiences can be measured in a variety of ways. From the perspective of the faculty, student learning outcomes such as learners’ knowledge, skills, would be of the utmost importance. Attitudinal results may also be of interest to both students and faculty. For students, factors such as interest, motivation, and engagement are directly related to learner success and therefore could be evaluated. Faculty perceptions of success may be influenced by their attitudes toward online instruction and all that it entails. All of these programmatic outcomes, including course and program completion rates, market reach, faculty time investments, and effects on promotion and tenure processes, are relevant to the provision of distance courses and programs. The reliability of selected technological delivery systems, the provision of and access to learner support systems, support for faculty professional development for online teaching pedagogies and tools, policy and governance issues related to distance program development, and quality assurance are all possible areas of evaluation inquiry. All these factors can impact the effectiveness of distance and online learning experiences and can inform the design and implementation of learning experiences and programs (Hodges *et al.*, 2020).

Overall, the theoretical contribution of this review to the scientific literature on personalized education is to shed light on the relationship between individual differences factors, personality traits, and the learning experience as expressed by students of HEIs in times of emergency online learning. Another objective is to expand scientific knowledge of adapting educational practices to students’ needs so as to improve the quality of the whole learning experience and outcomes.

The quality and success of education depends critically on recognizing and empathizing with students whose adaptability, self-management, and motivation levels are low or whose feelings of loneliness and anxiety are high, and creating an effective personalized learning environment. Considering how important self-awareness, self-management, responsible decision-making, relationship skills, and social awareness are to one’s overall success in life,

incorporating aspects of social and emotional learning (SEL) into one's educational experience may prove to be beneficial (Jagers *et al.*, 2019; Steinberger *et al.*, 2021). The application of innovative forms of gaming to educational settings has the potential to enhance students' academic and social experiences, as well as to foster a constructive atmosphere in the classroom. The development of a variety of online collaborative tools that encourage active participation from students could foster students' engagement (Steinberger *et al.*, 2021). Moreover, the modes of assessment utilized in such courses should be oriented toward more inventive real-time formats to enable sociable, active, and outgoing individuals to utilize their innate characteristics for greater achievement results (Rivers, 2021).

Historically, character development has been an important outcome of higher education (Boyer 1987; Berkowitz and Fekula, 1999; Dalton *et al.*, 2004; Johnson *et al.*, 2010). It's crucial for society to have well-educated individuals, capable of both pursuing their own interests while also being willing to fulfill their social and civic responsibilities. Furthermore, the essential qualities of mind and character are refined, perhaps more than any other time, during the higher education period (Boyer 1987). Success and quality in education are determined not only by academic achievement but also by the entire process of cultivating thought, ethos, communication, and the essential interaction through which the personality is developed and the essential human values and principles are cultivated. Education is intertwined with the goal of achieving the right values; the formation of a qualitative character is the central interest of education, as well as the parallel and equal exercise of intellectual and ethical virtue (Aristotle, *Nicomachean Ethics*). One of the issues of further research lies in the effects of distance or hybrid learning environments and the required electronic, information, and communication resources, as well as the investigation of appropriate methods taking individual trait differences into account in order to achieve excellence of thought as well as excellence of character beyond other learning outcomes.

Despite the obstacles, the forced experiment of the last two years gives HEIs a once-in-a-generation shot to gain strategic decisions on the transition from learning during a crisis to learning from a crisis. Global best practices indicate that scaling online education requires, among others, a student-centered approach, early faculty involvement and support for academic staff, and standard operating procedures that are aligned with learners' needs. The long-term benefits of effective digital learning, such as more customized, adaptive learning paths and increased access to higher education even for historically underprivileged populations, may outlast the COVID-19 pandemic (Laufer *et al.*, 2021).

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