

## The relationship between Personality Traits, Learning Styles and Academic Performance of E-Learners

Nabia Luqman Siddiquei & Ruhi Khalid   
Beacon House National University (Pakistan)  
aiban\_20@hotmail.com & rkhalid@bnu.edu.pk

### Abstract

The rapid growth of e-learning has greatly influenced the educational system across the globe. Personality traits and learning styles are both likely to play considerable roles in influencing academic achievement of e-learners. Based on this foundation, a study was designed that attempts to establish the missing links between personality traits, learning styles, and academic performance of students enrolled in various e-learning courses. University students (N=144) completed the Big Five Inventory (BFI), Index of Learning Style (ILS) and reported their grade point average (GPA). One of the Big Five traits i.e. extraversion was positively related with all four learning styles whereas neuroticism was negatively related with all four learning styles. It has also been revealed that GPA was positively correlated with three personality traits and was negatively correlated with neuroticism. Similarly GPA was positively correlated with three learning styles. Finally, there were no significant differences in learning styles and personality traits of e-learners in terms of gender. Implications of these results are expected to help academics, managers, and policy makers for implementation of future e-learning strategies in Pakistan.

**Keywords:** Personality traits, Learning styles, Academic performance, E-learning

### Introduction

Over the last few years, information and communication technology (ICT) has become undoubtedly the most important part of our social milieu and considered as an era of Internet revolution. With the emergence of this latest technology, electronic learning i.e. e-learning has evolved. E-learning involves the utilization of the electronic technologies to access educational avenues outside the traditional classroom (Moore & Kearsley, 2005). E-learning is a new method of interaction between learner and teacher that is mostly carried out either in a form of image, text and/or sound (Fahy & Ally, 2005). The recent trends of e-learning, its success and effectiveness of this mode of educational method are being explored by many researchers. These researchers discussed diverse variables in which learner's success factor, learners' satisfaction, self-efficacy, psychological well being, achievement motivation, cognitive styles, as well as learning styles are included (Fahy & Ally, 2005; Offir, Beezalel & Barth, 2007; Bates & Khasawneh, 2007).

E-learning environment has brought about a distinctive psychological arena like all other learning environments. In the related literature, it has been widely accepted that personality traits as well as learning style plays a considerable role for learners and both variables have been explored quite often (Conard, 2006). As far as e-learning perspective is concerned, both personality traits and learning styles have recognized as reliable sources in order to investigate and examine the e-learners' academic behavior (Hamburger & Ben-Artzi, 2003).

Keeping this fact in mind, it is a dire need to concentrate on learning environments that meet definite learners' characteristics. In this context, educational researchers should require to develop ways of addressing diverse learning styles and varied personality traits of students especially in e-learning environments, so that, e-learners will find ways to become successful in their respective domains.

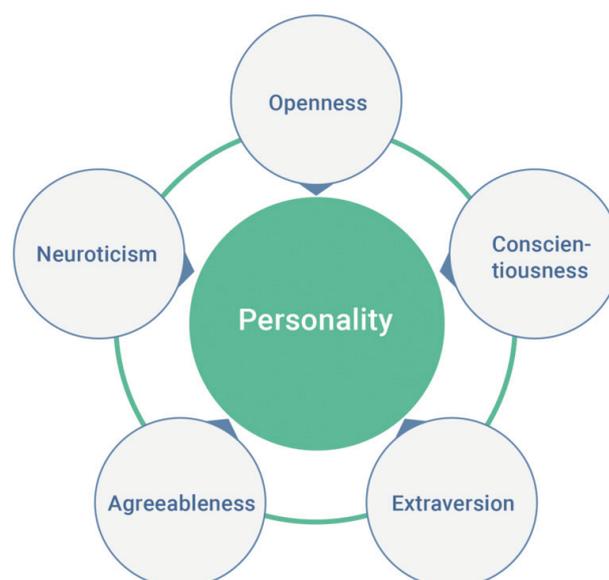
Though numerous studies have investigated the relationship of personality traits with many related concepts but there is a scarcity of research studies emphasizing the relationship between learning styles, personality traits and academic achievement (Caspi, Roberts & Shiner 2005).

This study, therefore, intends to provide a preliminary research to encourage the importance of individual differences in personality traits and learning styles of e-learners in order to achieve their academic performance. As it has been suggested by Litzinger, Lee, Wise and Felder (2007), to provide individualized instruction is not the ultimate goal of teaching and learning; rather to identify factors of balanced instruction. The findings of this research will help us not only to examine, investigate and address learners' individual differences but benefit us to develop student-centered classrooms in order to maximize their learning at the end.

## Conceptual Framework

In this research study personality traits have been described under the umbrella of “Five-Personality-Factor Model”. Though, Big Five have been defined from different dimensions (Goldberg, 1993). Yet it can be defined precisely as “fairly fixed characteristic of an individual”. It is an ability of an individual to interact with new information and novel circumstances (Jung, 1971). Personality traits are relatively inherent features of the person and usually considered as static (Verma & Sheikh, 1996). The Big Five characterized by openness to experience, conscientiousness, extraversion, agreeableness and neuroticism (McCrae & Costa, 1989; Goldberg, 1993; Saucier, 1994; Judge, Bono, Ilies, & Gerhardt, 2002) (See figure 1).

According to John & Srivastava (1999), Openness to experience trait is characterized as intellectually curious, imaginative, hold unconventional beliefs. People with high score on this trait are likely to be more adventurous, creative and have the ability to think outside the box. People with low score on this trait are likely to be more conventional and may struggle with abstract thinking. Conscientiousness is a personality trait that can be characterized as thoughtfulness, tendency to control impulse, behave in socially acceptable ways and facilitate goal directed behavior (John & Srivastava, 1999).



**Figure 1: Big Five Personality Traits**

Extraversion is a trait that can be described as friendly, sociable, assertive, talkative, emotionally expressive and cheerful. Individuals high on this trait have a tendency to gain energy in social settings and are usually outgoing. Agreeableness dimension of personality consists of characteristics such as trustworthy, helpful, altruism, kind, considerate, generous and don't hesitate to sacrifice their interest (John & Srivastava, 1999). Neuroticism dimension of personality refers to those who have tendency to experience anger, sadness, emotional instability and variety of negative emotions are frequently observed in people who scored high on neuroticism (John & Srivastava, 1999).

In e-learning environment, extroversion and introversion plays a dominant role in enhancing academic performance of e-learners. E-learning environment can be considered beneficial for those students who have introverted preferences as there is no presence of teachers and the fellow students. It can be helpful for these students as such students rely upon nonverbal communication as compared to verbal communication (Atashrouz, Pakdaman & Asgari, 2008).

Therefore, personality trait theory is considered as an imperative source of understanding of individual academic differences in the current study particularly within the context of e-learning. This study would also helps to explore which prominent traits of e-learners would predict better academic performance. This research study would also provide the abundant knowledge for teachers to gain insight of learning differences of e-learners so that they can gather understanding of students' behaviors. Hence, the current study will be beneficial for the instructors to develop and restructure their courses in a way that suit online requirements and address differing learning styles (Siddiquei & Khalid, 2017).

## Learning Style

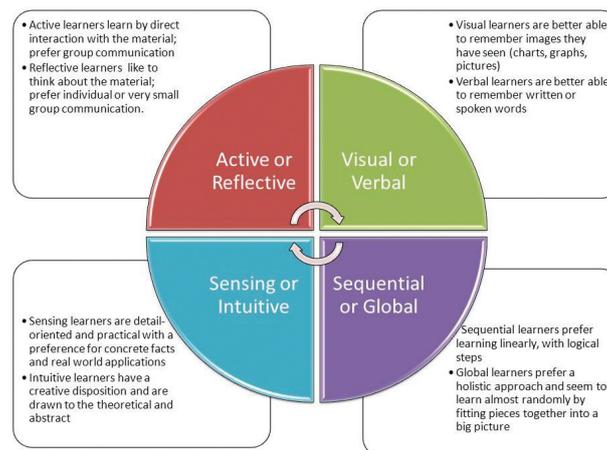
The notion that each student has his/her own ways of learning is termed as "Learning Style" which is another theoretical framework for current research study. It can be defined as cognitive, affective, and psychological characteristics which function as constant indicators of how student learn and respond to a learning environment (Felder & Spurlin, 2005). The role of individual differences in learning has been explored in numerous studies in recent years and it has been accepted widely that learning style has become an imperative for development of educational processes. It has also been recognized in various researches during past few decades that learner's intellectual ability is not the only factor of academic performance but it also depends on the learner's preferred learning styles (Kolb, 1984). As suggested by Felder (1993), that wide variety of instructional methods needs to be adapted by teachers and instructors in order to accommodate learners' individual differences, rather than a single strategy which is not enough for all students.

This research study employs learning style under the notion of Felder and Silverman's (1988) learning styles model. It is based on Kolb's Learning Style Inventory (Kolb & Kolb, 2005). In Index of Learning Style, Felder and Silverman (1988) provided four dimensions of learning styles including sensing-intuitive, visual-verbal, active-reflective and sequential-global (see figure 2).

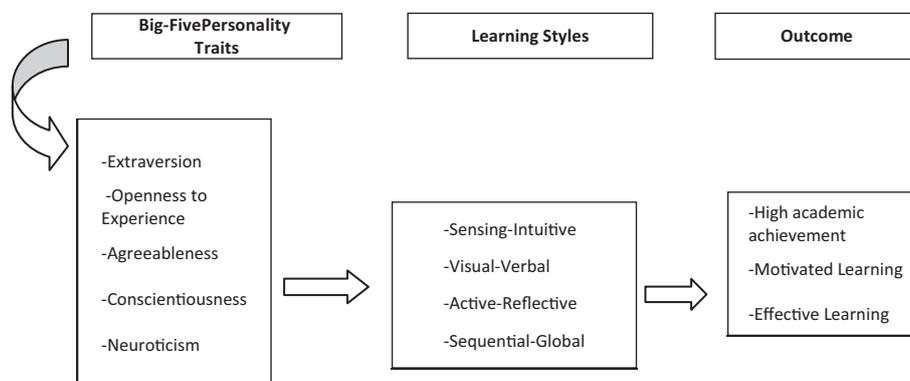
The main purpose to use the Felder and Silverman's (1988) learning style model in the current study is that it would help instructors and teachers to categorize students based on their preferred styles. In addition, limited research studies measured the relationships among the Big Five, learning styles, and academic performance (Bates & Khasawneh, 2007).

## E-Learning

In the era of technological revolution and rapidly prevailing society ills such as terrorism, e-learning has become most popular and rapidly growing educational method of choice not only for students



**Figure 2: The four Dimensions of Learning Styles**



**Figure 3: Graphical Representation of Big Five Personality Traits, Learning Styles & Academic Achievement**

but for the institutions as well. It has become one of the mainstream instructional delivery system (Barkhi & Brozovsky, 2003). It has been evident in numerous studies that there are an increasing number of students who prefer e-learning (Blickle, 1998). Research studies have also highlighted the characteristics why learners prefer this setting more than conventional learning environment (Berge & Mrozowski, 2001). Still, there is not over abundance of researches related to characteristics of e-learners i.e. factors related to e-learners academic performance and their achievement in e-learning settings (Blickle, 1998).

Hence, it has been repeatedly reported that both i.e. personality traits and learning style have significant influence on student's learning (Wolk & Nikolai, 1997) and enhance the academic performance of learners as well. Therefore, e-learners performance particularly in e-learning settings would be predicted by focusing on the two (see figure 3).

### Significance of the Study

It has been documented in previous researches that personality traits and learning styles both are somewhat coupled with academic performance. Yet little is known about the joint relationship of personality trait, learning style and academic performance. In this study, researcher aimed to bridge

the gap by directly investigating the relationships between personality, learning styles, and academic performance and hence to enrich the literature. The significant implication of research in this realm, perhaps, is to explore and examine the relationship between learners' individual differences and their academic performance outcomes. This research will benefit educationist as well as instructors in order to create more efficient and successful learning environments so that learners with variety of individual differences could be specifically accommodated.

By investigating personality traits and learning styles within e-learning setting, outcome of study should help educators, instructors, designers and developers in improving educational delivery as well as assists to serve the individual needs of e-learners. The significance of such researches particularly within e-learning settings is colossal. While Oblinger, Barone and Hawkins (2001) suggested that college students are enormously increasing while university campuses are insufficient with reference to space in order to accommodate the rising numbers of student population. It is considered as prime advantage of e-learning settings that increasing number of students can be accommodated with no structural modifications. It will also help to enhance students' enrollment by overcoming the barriers of physical proximity. It will also facilitate educational psychologists, developers and instructional practitioners to locate new ways of administering curriculum and develop course design effectively.

With particular reference to e-learning, it is a dire need to explore such areas of personality trait and learning style for enhancing e-learners performance. It is crucial to understand the significance of such researches for the promotion of different types of learning environments. With the growing number of population of e-learners, it is also significant to establish a connection between learners' personality traits and their learning styles to a particular environment, which might have remarkable influence on student academic performance. This will also be beneficial for institutions as it will not only boost student satisfaction and increased enrollment as well. This study will provide supplement in existing literature and a significant addition in the knowledge with regard to examine the relationship between personality traits, learning style and academic performance of e-learners in particular.

## Research Objectives

This study served following purposes:

1. To explore the relationship among big five personality traits, learning styles and academic performance.
2. To examine different learning styles in terms of gender.
3. To examine big five personality traits in terms of gender.

## Literature Review

This study was guided by the big five model for understanding personality traits whereas learning style was studied under the notion of Felder and Silverman's (1988) learning styles model. Previous studies based on the relationships among Big Five personality traits, learning styles, and academic performance have been discussed in this section. It has been identified that cognitive and non-cognitive individual differences in the development of knowledge play a decisive role (Furham & Chamorro-Premuzic, & McDougall 2003). In several studies non-cognitive differences e.g. big five personality traits as compared to cognitive differences are explored as better predictors of academic success (e.g., Furham & Chamorro-Premuzic, & McDougall, 2003; O'Connor & Paunonen, 2007). It has also been found in several other research studies that academic performance was directly correlated with personality traits and learning styles (Barchard, 2003; Duff, Boyle, Dunleavy, & Ferguson, 2004; Noffle & Robins, 2007). However, there is some disparity in identifying the particular personality traits

and learning styles, which is considered as better predictor of academic performance of students (Trapmann, Hell, Hirn, & Schuler, 2007).

Similarly, numerous researchers (e.g., Rothstein, Paunonen, Rush, & King, 1994; Trapmann et al., 2007) investigated the influence of personality traits on affective and cognitive academic performance in which GPA, state test score, individual score and students' satisfaction have also been included. In these researches, it was revealed that big five personality traits plays an imperative role in enhancing academic performance (O'Connor & Paunonen, 2007; Trapmann et al., 2007).

It has also been identified in prior literature that Big Five personality traits plays more significant role in order to predict academic performance. Barchard (2003), Duff et al. (2004), Noftle and Robins (2007) and O'Connor and Paunonen (2007) have identified that conscientiousness among all the Big Five personality traits, was considered as most significant trait as well as consistent contributor in predicting academic performance.

Consistently, several other studies was also established that conscientiousness and GPA was positively associated with each other (Barchard, 2003; Chamorro-Premuzic & Furham, 2003; Duff et al., 2004; Oswald et al., 2004; Noftle & Robins, 2007; Laidra, Pullmann, & Allik, 2007). Moreover, Kappe & van de Flier (2010) have identified that other than Conscientiousness, another Big Five personality trait such as openness to experience has also been found as a major contributor in academic performance. Similarly, Rothstein et al. (1994) revealed that openness is also positively correlated with classroom performance and GPA as well.

In spite of the consistent findings, mix results have also been explored in several different studies related to extroversion, emotional Stability and agreeableness, the other three personality traits. In this regard, a negative relationship was identified between personality traits, such as extroversion, emotional stability and agreeableness, and academic performance by Furham and Chamorro-Premuzic (2003). Furthermore, academic achievement for example, GPA was negatively correlated with emotional instability and extraversion (Furham & Chamorro-Premuzic, 2003; Duff et al., 2004), Rothstein et al. (1994) explored that agreeableness have a negative relationship with examination grades.

Inconsistent with these studies, it has been reported that there is no gender differences between openness to experience and conscientiousness (Costa, Terracciano & McCrae, 2001). However, gender differences in agreeableness were consistently revealed in other studies (Weisberg, 2011; Costa, Terracciano & McCrae, 2001). Hence, this study sought to explore the relationships between Big Five and academic performance in view of the above mentioned inconsistent results of the Big Five personality traits and academic performance.

Numerous studies like Kolb (1984), Felder and Silverman (1988) and Vermunt (1998) have explored learning styles in diverse ways and classified learning styles in various ways in their studies. For instance, Kolb (1984) categorized learners into four groups. These are: assimilators, accommodators, divergers, and convergers (Kolb & Kolb, 2005). However, prior researches on various learning style models constantly explored student learning styles and revealed that there are different ways in which students learn and behave in courses that could match or mismatch with their particular learning styles (Liu & Graf, 2009). As shown by Felder and Silverman (1988) students enrolled in engineering courses tend to be more sensors and as a result earned lower grade in their respective courses as compare to tutors.

Similarly, it has been found that as compared to reflective learners, active learners experienced many difficulties in adapting to mismatch courses (Liu & Graf, 2009). They have also reported that sequential learners enrolled in online classes frequently visited learning objects as compared to global learners. As investigated by Kim & Moore (2005) that the learners' preferred learning styles and their achievement was positively correlated to each other in English courses. Those learners

used auditory learning styles more frequently. In addition, in another study, Alaoutinen and Smolander (2010) explored that the class will perform better if the learning styles and the teaching methods are parallel to each other. Furthermore, the literature provides evidence that learning styles and academic performance also differs in terms of gender. Again, Bates and Khasawneh (2007) supported that there is also gender differences in term of particular learning styles as it has been identified that females as compared to male students are more intuitive and global. Still, it has also been observed that there is a variation in gender differences.

In the present research, this gap of existing literature will be filled by directly exploring the relationships between five personality traits, learning styles, and academic performance and by investigating personality trait and learning style in terms of gender. Following hypothesis will be tested:

1. There is a significant positive relationship between Openness personality trait and Active-Reflective learning styles of e-learners as well as their academic achievement.
2. There is a significant positive relationship between Conscientiousness personality trait and Sensing-Intuitive learning styles of e-learners as well as their academic achievement.
3. There is a significant positive relationship between Agreeableness personality trait and Sequential-Global learning style of e-learners as well as their academic achievement.
4. There is a significant negative relationship between Neuroticism personality trait and all four learning styles (i.e. Active-Reflective, Sensing-Intuitive, Visual-Verbal and Sequential-Global) of e-learners as well as with academic achievement.
5. There is a significant positive relationship between Extraversion personality trait and Visual – Verbal learning style of e-learners as well as their academic achievement.
6. There is a significant difference between personality traits of e-learners with respect to gender.
7. There is a significant difference between learning styles of e-learners with respect to gender.

## Research Methodology

### *Participants*

The data was collected from students of Virtual University of Pakistan enrolled in different degree programs. The research sample was consisted of total 144 students (60 males; 84 females). The age of respondents was 16 to 35 years. The sample was characterized further based on the demographic variables such as age, gender, study course, semester and GPA of last semester. Convenience sampling technique, a well-known non-probability sampling technique, was used in selecting the participants for the study.

### *Measures*

The Big Five Inventory (BFI), the Index of Learning Style (ILS), and demographic information sheet was completed by the respondents of the study.

### *The Big Five Inventory (BFI)*

The study adopted a 44- item self-report inventory, developed by John, Donahue, and Kentle (1991) that comprised of adjectives that evaluate the Five Factor Model domains. This instrument has been used extensively and considered as vigorous measure of personality with sound psychometric properties. This instrument consisted of five scales, which include: Extraversion (8 items), Agreeableness (9 items), Conscientiousness (9 items), Neuroticism (8 items), and

Openness (10 items). In this questionnaire, the 5-point Likert scale within a range from 5 for strongly agree to 1 for strongly disagree. Coefficient alphas and test-retest reliabilities across scale scores have been considered as satisfactory (Worrell & Cross, 2004).

The Big Five Inventory (BFI) was chosen for this particular study because it is not only brief and concise but also has established strong internal consistency, retest reliability, convergence with longer version of Big Five measures, and self-peer agreement (John & Srivastava, 1999; Soto & John, 2009). Secondly, the Big Five Inventory (BFI) could be finished within 15 minutes, which is beneficial for a study so that it was also expected that each participant could complete it in a limited amount of time.

### ***Index of Learning Style (ILS)***

The Index of Learning Style (ILS) was used to measure learning styles of e-learners; it was developed by Felder and Soloman (2004). The 44- items questionnaire consisted of four scales; each scale further comprised of 11 items, which includes active-reflective, sensing-intuitive, visual-verbal, and sequential-global. In this questionnaire every item contains a sentence that needs to be answered from selecting one of two options. In this way, preferred learning style of learners could be detected.

### ***Demographic profile***

The demographic sheet was developed by the researcher in order to collect background information from the research participants. It includes gender, age, semester, GPA in last semester. With reference to multiple studies (e.g. Bartling, 1988; Busato, Prins, Elshout, & Hamaker, 1998), it has been decided to express academic performance through GPA, which stands for the average grade earned by a student, figured by dividing the grade points earned by the number of credits attempted (ACAP, n.d.).

### ***Procedure***

The participants of the study were approached. A booklet consisting of demographic sheet, Index of Learning Style (ILS), Big Five Inventory (BFI) was distributed among one hundred and fifty enrolled in different degree programs. It was estimated that the questionnaire took approximately 15–20 minutes to complete. Finally 140 questionnaires were collected from student. The response rate indicates 93% on the basics of total questionnaires. Another 4 questionnaires were excluded due to the missing data and incomplete questionnaires. The participants were informed about the study before administering the questionnaire. After then instructions were given to them. The participants were also instructed to carefully read the instructions given at each part of the questionnaire. They were also instructed to complete the task carefully and do not omit any statement or leave it unfilled.

## **Results**

Table 1 illustrates the Pearson product-moment correlation coefficient to assess the relationship between personality traits, learning styles and academic achievement of e-learners.

As table 1 show, there are a number of significant relationships indicated by correlation analysis. Particularly, consistent with our hypotheses, (a) Openness personality trait was positively correlated with Active-Reflective learning styles of e-learners (b) Conscientiousness personality trait was positively correlated with Sensing-Intuitive learning styles of e-learners (c) agreeableness was positively related to Active, Sensing, Visual and Sequential learning styles where as negatively correlated with all the other learning styles (d) extraversion was positively

Table 1: Correlations among Personality Traits, Learning Style, and GPA (n = 144)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Extraversion	-	0.082	0.042	.265**	.199*	.228**	.236**	0.027	0.036	0.126	0.126	0.025	0.025	0.04
Agreeableness		-	.443**	0.161	.457**	0.113	-0.118	.261**	-.268**	.335**	-.335**	0.102	-0.102	0.009
Conscientiousness			-	0.095	.303**	0.038	-0.046	.239**	.247**	0.103	-0.103	-0.041	0.041	0.162
Neuroticism				-	0.011	-0.059	0.061	-0.068	0.071	-0.138	0.138	-.199*	.199*	-0.118
Openness					-	.234**	-.243**	0.056	-0.066	.376**	-.376**	0.065	-0.065	0.015
Active						-	-.996**	0.057	-0.064	0.039	-0.039	-0.085	0.085	0.003
Reflective							-	-0.045	0.058	-0.038	0.038	0.08	-0.08	-0.011
Sensing								-	-.997**	-0.025	0.025	-.231**	.231**	-0.013
Intuitive									-	0.026	-0.026	.230**	-.230**	0.007
Visual										-	-1.000**	.185*	-.185*	0
Verbal											-	-.185*	.185*	0
Sequential												-	-1.000**	-.058
Global													-	0.058
GPA														1

Note: \*p < .05; \*\*p < .01

**Table 2: Independent Sample t-test for measuring Gender differences in Personality Traits**

Variable	Gender	N	M	SD	t	p
Extraversion	M	60	24.65	4.95343	-0.166	0.73
	F	84	24.7857	4.73915		
Agreeableness	M	60	29.15	5.95413	-1.134	0.011
	F	84	30.5714	8.30196		
Conscientiousness	M	60	27.95	4.99296	-1.721	0.093
	F	84	29.6429	6.341		
Neuroticism	M	60	23.6333	4.5769	-1.156	0.975
	F	84	24.5714	4.95105		
Openness	M	60	32.1	4.9871	0.628	0.989
	F	84	31.5476	5.35579		

**Table 3: Independent Sample t-test for measuring Gender Differences in Learning Styles**

	Gender	N	Mean	SD	t	P
Active	M	60	5.6	1.64883	-1.242	0.355
	F	84	5.9643	1.7932		
Reflective	M	60	5.4	1.64883	1.145	0.285
	F	84	5.0595	1.83245		
Sensing	M	60	4.8667	2.15868	-4.114	0.632
	F	84	6.3571	2.13204		
Intuitive	M	60	6.1333	2.15868	4.069	0.558
	F	84	4.6667	2.11326		
Visual	M	60	5.9	1.70443	0.124	0.12
	F	84	5.8571	2.25026		
Verbal	M	60	5.1	1.70443	-0.124	0.12
	F	84	5.1429	2.25026		
Sequential	M	60	6.3167	1.80856	2.419	0.832
	F	84	5.5714	1.83202		
Global	M	60	4.6833	1.80856	-2.419	0.832
	F	84	5.4286	1.83202		

related with all the four learning styles (e) Finally Neuroticism was negatively correlated with all the four learning styles. It is interesting that GPA was positively correlated with three personality traits (i.e. openness, agreeableness, and conscientiousness) and was negatively correlated with Neuroticism personality trait. Similarly GPA was positively correlated with three learning styles i.e. Active, Intuitive and Global learning styles and was negatively correlated with Reflective, Sensing and Sequential learning styles. However, no relationship was found between GPA and Visual-Verbal learning styles

Table 2 illustrates the Independent sample t-test to assess the significant difference between personality traits of e-learners with respect to gender.

As table 2 shows, there were significant gender differences among the e-learners in three of the personality traits i.e. Agreeableness, Conscientiousness and Neuroticism. Females show high level of agreeableness and Conscientiousness as compared to males.

Table 3 illustrates the Independent sample t-test to assess the significant difference between learning styles of e-learners with respect to gender.

As table 3 shows, there were no significant differences in learning styles of e-learners in terms of gender.

## Discussion

The results established a number of significant relationships between the Big Five personality traits, learning styles, and academic achievement. The result also showed that there are significant differences between the e-learners in three of the personality traits: Agreeableness, Conscientiousness and Neuroticism in terms of gender. Moreover, it is also revealed that there are no significant differences in learning styles of e-learners regarding gender. Specifically, a number of practical insights and implications have been provided by the result findings of the current study on the strong relationships between personality traits and learning styles, and their joint influence on academic achievement as well.

First, there are several significant implications of personality results for students and instructors. Personality traits have a facilitative role in learning process of e-learners and it also helps to motivate the e-learners. These traits are of utmost importance for the e-learners with respect to their academic performance an achievement in learning environment (Ibrahimoglu, Unaldi, Samancioglu, & Baglibel, 2013). Such students are able to deal with time management, create their own learning environment, enjoy challenging tasks and their intrinsic motivation facilitates their learning process and in turn enhances academic achievement of students enrolled in different e-learning programs across the world. These findings are consistent with other studies (Furnham, Chamorro-Premuzic, & McDougall, 2003; Lounsbury et al., 2003; Chamorro-Premuzic & Furnham, 2003; Duff et al., 2004; Dunsmore, 2005; Atashrouz, Pakdaman & Asgari, 2008; Di Fabio & Palazzeschi, 2009).

Secondly, the results also highlighted that personality traits and learning styles are correlated to each other, which could guide e-learners to enhance learning and, as a result the fulfillment and self-satisfaction of learning process will be improved among e-learners. It shows that learning is the origin of all captivating improvement and advancement of learners. This study provides clear evidence that conscientiousness and many of the learning styles were positively correlated and also have strongest association along with GPA. In this way, conscientiousness not only aid a variety of successful learning strategies but also considered as valuable characteristic in order to attain academic performance in particular. This finding is consistent with other studies (Zweig & Webester, 2004; Martin, Montgomery & Saphian, 2006; Hoswini & Latifian, 2009; Komarraju, Karau & Schmeck, 2009).

Consistent with other studies, such as Chamorro-Premuzic and Furnham (2003), Lounsbury (2003), Khormaii and Kheir (2006), Laidra, Pullmann and Allik (2007); Atashrouz, Pakdaman and Asgari (2008), Komarraju, Karau and Schmeck (2009), have revealed that agreeableness and most of the learning styles were significantly correlated and with GPA as well. Likewise Openness was significantly correlated with Active, Reflective, Visual and Verbal learning styles and GPA as well. These findings suggest that, in addition of being conscientious, learners who are cooperative and intellectually curious may also benefit from learning process. In this regard, teachers and instructors who understand the significant role of personality traits and considered them as important for academic performance will possibly devise courses, assignments and other teaching methods that promote and enhance conscientiousness, openness and agreeableness.

The results of the present study revealed that neuroticism was negatively correlated with all the learning styles. It is interesting that GPA was positively correlated with openness, agreeableness, and conscientiousness personality traits and was negatively correlated with neuroticism personality trait. It is somewhat consistent with other research studies (Matthews & Zeidner, 2004; Entwistle & Tait, 1996).

Third, the study was consistent with the notion that all four learning styles were correlated with GPA, in order to correspond to different learning approaches of e-learners and process as well as perceive information that plays a significant role for learning (Schmeck, Ribich & Ramanaiah, 1977). Most of the research studies in this regard emphasized that every student follows a different learning style and differ in their attitudes towards the learning process. Offir, Bezalel and Barth (2007) revealed that sequential learning style and academic achievement both are significantly associated with each other. The results are somewhat identical with the results of the present study. According to Pashler, McDaniel, Rohrer and Bejork (2008) students will perform better if their learning styles are in accordance with their personality characteristics. In another study, it has been explored that abstract conceptualization of learning style is directly correlated with academic achievement in mathematics and English language (Homayoni & Abdolahi, 2003).

In conclusion, the results of present study make an essential contribution to our understanding by identifying a number of connecting links between personality, learning styles, and academic performance. Future research would possibly expand our understanding of the intricate nature of academic performance by exploring different but related factors (such as self-efficacy) as well as environmental factors such as socioeconomic status or different other institutions as predictors of academic performance.

## References

- ACAP (n.d.). *Grade Table and GPA*. Retrieved from <https://www.acap.edu.au/current-students/managing-my-course/student-handbook/new-two-column-page/>
- Alaoutinen, S., & Smolander, K. (2010, June). Student self-assessment in a programming course using bloom's revised taxonomy. In *Proceedings of the fifteenth annual conference on Innovation and technology in computer science education* (pp. 155–159). ACM.
- Atashrouz, B., Pakdaman, S. H., & Asgari, A. (2008). Prediction of academic achievement from attachment rate. *Journal of Family Research*, 4(2), 193–203.
- Barchard, K. A. (2003). Does emotional intelligence assist in the prediction of academic success? *Educational and psychological measurement*, 63(5), 840–858.
- Barkhi, R., & Brozovsky, J. (2003). The influence of personality type on a distance course in accounting. *Journal of Educational Technology Systems*, 32(2–3), 179–198. <https://doi.org/10.2190%2FDUVG-JKJY-X1VH-2RNV>
- Bartling, C. A. (1988). Longitudinal changes in the study habits of successful college students. *Educational and psychological measurement*, 48(2), 527–535.

- Bates, R., & Khasawneh, S. (2007). Self-efficacy and college students' perceptions and use of online learning systems. *Computers in Human Behavior*, 23(1), 175–191.
- Berge, Z. L., & Mrozowski, S. (2001). Review of research in distance education, 1990 to 1999. *American Journal of Distance Education*, 15(3), 5–19.
- Blickle, G. (1998). Personality traits, learning strategies, and performance. *European Journal of personality*, 10(5), 337–352.
- Busato, V. V., Prins, F. J., Elshout, J. J., & Hamaker, C. (1998). The relation between learning styles, the Big Five personality traits and achievement motivation in higher education. *Personality and individual differences*, 26(1), 129–140.
- Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: Stability and change. *Annual Review of Psychology*, 56, 453–484.
- Chamorro-Premuzic, T., & Furnham, A. (2003). Personality predicts academic performance: Evidence from two longitudinal university samples. *Journal of research in personality*, 37(4), 319–338.
- Conard, M. A. (2006). Aptitude is not enough: How personality and behavior predict academic performance. *Journal of Research in Personality*, 40(3), 339–346.
- Costa Jr, P. T., Terracciano, A., & McCrae, R. R. (2001). Gender differences in personality traits across cultures: robust and surprising findings. *Journal of personality and social psychology*, 81(2), 322.
- Di Fabio, A., & Palazzeschi, L. (2009). An in-depth look at scholastic success: Fluid intelligence, personality traits or emotional intelligence? *Personality and Individual Differences*, 46(5–6), 581–585.
- Duff, A., Boyle, E., Dunleavy, K., & Ferguson, J. (2004). The relationship between personality approach to learning and academic performance. *Personality and individual differences*, 36(8), 1907–1920.
- Dunsmore, J. A. (2005). *An investigation of the predictive validity of broad and narrow personality traits in relation to academic achievement* (Doctoral dissertation, University of Tennessee, Knoxville).
- Entwistle, N., & Tait, H. (1996). Identifying students at risk through ineffective study strategies. *Higher education*, 31(1), 97–116.
- Fahy, P. J., & Ally, M. (2005). Student learning style and asynchronous computer-mediated conferencing (CMC) interaction. *The American Journal of Distance Education*, 19(1), 5–22.
- Felder, R. M. (1993). Reaching the Second Tier--Learning and Teaching Styles in College Science Education. *Journal of college science teaching*, 22(5), 286–90.
- Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Engineering education*, 78(7), 674–681.
- Felder, R. M., & Soloman, B. A. (2004). *Index of Learning Styles*. Retrieved from <http://www4.ncsu.edu/unity/lockers/users/ff/felder/public/ILSpage.html>
- Felder, R. M., & Spurlin, J. (2005). Applications, reliability and validity of the index of learning styles. *International journal of engineering education*, 21(1), 103–112.
- Furnham, A., Chamorro-Premuzic, T., & Mc Dougall, F. (2003). Personality, cognitive ability, and beliefs about intelligence as predictors of academic performance. *Learning and Individual Differences*, 14(1), 47–64.
- Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American psychologist*, 48(1), 26.
- Hamburger, Y., & Ben-Artzi, E. (2003). Loneliness and Internet use. *Computers in human behavior*, 19(1), 71–80.
- Homayoni, A. & Abdolahi, M. (2003). Investigating correlation between learning styles, cognitive styles and their roles in academic achievement of students. *Journal of Psychology*, 2, 179–197.
- Hoswini, F. A., & Latifan, M. (2009). The Prediction of goal orientation by five factors model of personality among Shiraz university students. *Journal of Psychological Studies*, 5(1), 73–94.
- Ibrahimoglu, N., Unaldi, I., Samancioglu, M., & Baglibel, M. (2013). The relationship between personality traits and learning styles: a cluster analysis. *Asian Journal of Management Sciences and Education*, 2(3), 93–108.

- John, O. P., Donahue, E. M. & Kentle, R. L. (1991). *The Big Five Inventory-Versions 4a and 54*. Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.
- John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of personality: Theory and research*, 2(1999), 102–138.
- Judge, T. A., Bono, J. E., Ilies, R., & Gerhardt, M. W. (2002). Personality and leadership: a qualitative and quantitative review. *Journal of applied psychology*, 87(4), 765.
- Jung, C. G. (1971). Psychological types. The collected works of CG Jung. Princeton University Press, 18(6), 169–170.
- Kappe, R., & van der Flier, H. (2010). Using multiple and specific criteria to assess the predictive validity of the Big Five personality factors on academic performance. *Journal of Research in Personality*, 44(1), 142–145
- Khormaii, F., & Kheir, M. (2006). Personality factors, motivational orientations and cognitive learning strategies, a causal model. *Journal of Social Sciences and Humanities of Shiraz University*, 25(4), 79–97.
- Kim, K. S., & Moore, J. (2005). Web-based learning: Factors affecting students' satisfaction and learning experience. *First Monday*, 10(11). <https://doi.org/10.5210/fm.v10i11.1294>
- Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of management learning & education*, 4(2), 193–212.
- Kolb, B. (1984). Functions of the frontal cortex of the rat: a comparative review. *Brain Research Reviews*, 8(1), 65–98.
- Komarraju, M., Karau, S. J., & Schmeck, R. R. (2009). Role of the Big Five personality traits in predicting college students' academic motivation and achievement. *Learning and individual differences*, 19(1), 47–52.
- Laidra, K., Pullmann, H., & Allik, J. (2007). Personality and intelligence as predictors of academic achievement: A cross-sectional study from elementary to secondary school. *Personality and individual differences*, 42(3), 441–451.
- Litzinger, T. A., Lee, S. H., Wise, J. C., & Felder, R. M. (2007). A psychometric study of the index of learning styles. *Journal of Engineering Education*, 96(4), 309–319.
- Liu, T. C., & Graf, S. (2009). Coping with mismatched courses: students' behaviour and performance in courses mismatched to their learning styles. *Educational Technology Research and Development*, 57(6), 739.
- Lounsbury, J. W., Tatum, H., Gibson, L. W., Park, S. H., Sundstrom, E. D., Hamrick, F. L., & Wilburn, D. (2003). The development of a Big Five adolescent personality inventory. *Journal of Psychoeducational Assessment*, 21(2), 111–133.
- Martin, J. H., Montgomery, R. L., & Saphian, D. (2006). Personality, achievement test scores, and high school percentile as predictors of academic performance across four years of coursework. *Journal of research in Personality*, 40(4), 424–431.
- Matthews, G., & Zeidner, M. (2004). Traits, states and the trilogy of mind: An adaptive perspective on intellectual functioning. In D. Y. Dai & R. J. Sternberg (eds.). *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development* (pp. 143–174). New York: Routledge.
- McCrae, R. R., & Costa, P. T. (1989). Reinterpreting the Myers Briggs type indicator from the perspective of the five-factor model of personality. *Journal of personality*, 57(1), 17–40.
- Moore, M. G., & Kearsley, G. (2005). *Distance education: A systems view of online learning*. Cengage Learning.
- Noftle, E. E., & Robins, R. W. (2007). Personality predictors of academic outcomes: big five correlates of GPA and SAT scores. *Journal of personality and social psychology*, 93(1), 116.
- O'Connor, M. C., & Paunonen, S. V. (2007). Big Five personality predictors of post-secondary academic performance. *Personality and Individual Differences*, 43(5), 971–990. <https://doi.org/10.1016/j.paid.2007.03.017>

- Oblinger, D., Barone, C. A., & Hawkins, B. L. (2001). *Distributed education and its challenges: An overview* (Vol. 1). Washington, DC: American Council on Education.
- Offir, B., Bezalel, R., & Barth, I. (2007). Introverts, extroverts, and achievement in a distance learning environment. *The American Journal of Distance Education*, 21(1), 3–19.
- Oswald, J., Boxberger, S., Jørgensen, B., Feldmann, S., Ehninger, G., Bornhäuser, M., & Werner, C. (2004). Mesenchymal stem cells can be differentiated into endothelial cells in vitro. *Stem cells*, 22(3), 377–384.
- Pashler, H., McDaniell, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest*, 9(3), 105–119. <https://doi.org/10.1111%2Fj.1539-6053.2009.01038.x>
- Rothstein, M. G., Paunonen, S. V., Rush, J. C., & King, G. A. (1994). Personality and cognitive ability predictors of performance in graduate business school. *Journal of Educational Psychology*, 86(4), 516.
- Saucier, G. (1994). Mini-Markers: A brief version of Goldberg's unipolar Big-Five markers. *Journal of personality assessment*, 63(3), 506–516.
- Schmeck, R. R., Ribich, F., & Ramanaiah, N. (1977). Development of a self-report inventory for assessing individual differences in learning processes. *Applied psychological measurement*, 1(3), 413–431.
- Siddiquei, N. L., & Khalid, R. (2017). Emerging Trends of E- Learning in Pakistan: Past, Present and Future. *International Journal of Law, Humanities & Social Science*, 2(1), 20–35.
- Soto, C. J., & John, O. P. (2009). Ten facet scales for the Big Five Inventory: Convergence with NEO PI-R facets, self-peer agreement, and discriminant validity. *Journal of Research in Personality*, 43(1), 84–90.
- Trapmann, S., Hell, B., Hirn, J. O. W., & Schuler, H. (2007). Meta-analysis of the relationship between the Big Five and academic success at university. *Journal of Psychology*, 215(2), 132–151.
- Verma, B. P., & Sheikh, C. Q. (1996). Cognitive style, personality and psychogenic needs. *Journal of the psychological researches*, 40, 62–68.
- Vermunt, J. D. (1998). The regulation of constructive learning processes. *British journal of educational psychology*, 68(2), 149–171.
- Weisberg, M. (2011). Student attitudes and behaviors towards digital textbooks. *Publishing Research Quarterly*, 27(2), 188–196. <https://doi.org/10.1007/s12109-011-9217-4>
- Wolk, C., & Nikolai, L. A. (1997). Personality types of accounting students and faculty: Comparisons and implications. *Journal of Accounting Education*, 15(1), 1–17.
- Worrell, F. C., & Cross, W. E. (2004). The reliability and validity of Big Five Inventory scores with African American college students. *Journal of Multicultural Counseling and Development*, 32(1), 18–32.
- Zweig, D., & Webster, J. (2004). What are we measuring? An examination of the relationships between the big-five personality traits, goal orientation, and performance intentions. *Personality and individual differences*, 36(7), 1693–1708.