

The Relationship between Learning Style, Personality, and Motivation of Architecture Students

This study aims to investigate the relationship between learning style, personality, and motivation among architecture students as opposed to the prevailing personality archetypes suggested by the previous literature and intends to evaluate architecture students' learning processes. The findings indicated that the elaborative process, which was connected with conscientiousness and challenge, was the governing learning style in architecture students, that architecture educators might consider take these traits into account when designing instructional material. This study is the first attempt to integrate these subjects into the architecture education literature by highlighting the significance of learning style, motivation, and personality relations and the design of curricula based on these connections.

Keywords: *Learning styles; personality traits; motivation; architecture student; architecture education*

Introduction

In architectural education, the learning process should be tailored to students' ways of thinking so as to teach in them an internal conviction on the significance of the curriculum and its prerequisites (Rabboh, 2020). This requires a grasp of the psychological characteristics and motivation of the students. Given that the primary objective of architectural education is to foster students' creativity, it is essential to recognize that creative individuals have a specific personality, behaviour, (Feist, 1998) and motivation (Strongman, 2022; Tohidi & Jabbari, 2012; Vero & Puka, 2017). Motivated students are more likely to establish and strive to achieve objectives, and more likely to attain better levels of success and acquire more knowledge (Wilson, 2009). To build appropriate curricula, it is crucial to comprehend the relationship between the learning process, personality, and motivation in educational settings. Many research has examined the link between learning style, personality, and motivation. (Busato et al., 1999; Komarraju et.al., 2011; Komarraju & Karau, 2005; Keshavarz & Hulus, 2019; Moldasheva & Mahmood, 2014; Moss, 1982; Olivosa, et al., 2016).

The majority of research in the literature are concerned with the assessment of students' or instructors' potentials from higher schools or different majors in universities. (Geisler-Brenstein et al.,1996; Komarraju et al. 2011; Komarraju & Karau, 2005; Moldasheva & Mahmood, 2014; Schmeck & Grove, 1979). To date, however, no studies have been published that comprehensively evaluate the relationship between personality, motivation, and learning styles of architecture students. Most of the literature in design and architecture education investigates the connection between design students' performance and learning techniques (Tezel & Casakin, 2010) or learning style, performance, and success of students in the various design process (Demirbas & Demirkan, 2003), determines the most effective way to improve architecture students' spatial thinking by addressing

1 learning styles in the design studio. (Mostafa & Mostafa, 2010) or investigates the
2 learning styles of architecture students and compares their learning styles with
3 their design studio performance (Kvan & Yunyan, 2005).

4 In this study, the Inventory of Learning Styles (ILS) which was established
5 by Schmeck et al. in 1977, utilized to comprehend the learning styles of
6 architecture students and their relation to personality and motivation. Since it was
7 founded on a concept of individual variations, the Inventory of Learning Processes
8 was chosen as the ideal tool to determine the learning styles of architecture
9 students in this study. A number of studies have examined the association
10 between learning style and personality. (Chamorro-Premuzic et al., 2007; Geisler-
11 Brenstein et al. 1996 ; Olsson et al., 2020; Siddiquei & Khalid, 2018) . Geisler-
12 Brenstein et al. (1996) explored the relationships between diverse learning
13 styles/strategies and personality in order to provide a more comprehensive
14 explanation for individual differences in functioning in general and the school
15 context in particular. Exploratory factor analysis of the Inventory of Learning
16 Processes-Revised and the NEO-Personality Inventory subscales indicated the
17 convergent and discriminant validity of six shared higher-order components. The
18 findings suggested that self-concept variables significantly alter personality and
19 learning style connections.

20 It is generally recognized that motivation and the accompanying concepts of
21 intrinsic and extrinsic are essential components of learning and education. (e.g.
22 Adamma et al.,2018; Champagne, 1998 ; Hayat et al.,2018; Pranitasari &
23 Noersanti, 2017; Prat-Sala & Redford, 2010; Zaccone & Pedrini, 2019). In most
24 of the studies Amabile et al. (1994)'s The Work Preference Inventory (WPI), was
25 utilized as the instrument for motivation assessment. For instance, Prat-Sala &
26 Redford (2010) evaluated the interrelationships between intrinsic and extrinsic
27 incentive orientation, self-efficacy (in reading academic materials and essay
28 writing), and study strategies (deep, strategic, and surface) via the Work
29 Preference Inventory and the Revised Approaches to Study Inventory. Both
30 intrinsic and extrinsic incentive orientations were shown to be linked with study
31 strategies.

32 Regarding the ILP, there are no published research that examine the
33 relationship between learning style and personality, or the relationship between
34 learning style and motivation among architecture students. This research intends to
35 evaluate the learning processes defined in the ILP, as well as the validity of the
36 learning processes stated in this inventory for architecture students. The Inventory
37 of Learning Processes (ILP), The Work Preference Inventory (WPI), and Big Five
38 Inventory (BFI) were used as measurement tools. For data analysis, SPSS.29
39 software was applied. A small sample (N= 50) of last-year architecture students at
40 Eskisehir Osmangazi University, Eskisehir, Turkey, were selected.

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1 **Methodology**

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3 *Participants*

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5 The study's participants were 50 undergraduate senior students at Eskisehir
6 Osmangazi University, Department of Architecture in Turkey, who were enrolled
7 in architectural design studio course during the 2021-2022 fall semester.
8 Participants were asked to complete a survey form about various parts of the
9 research. Before starting survey, each participant was required to read and sign a
10 permission form prepared by the study's author. Students were informed that they
11 might take as much or as little time as they choose to complete the tasks. Out of a
12 total of 55 students enrolled in the course 50 students voluntarily participated the
13 tests on the last week of the 2021-2022 Fall semester. The three exams
14 administered to the students were designated as ILP, Big five, and The Work
15 Preference Inventory test, in that order.

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17 *Measures*

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19 Students' learning strategies were assessed via The Inventory of Learning
20 Processes (ILP) of Schmeck et al. (1997) that have high reliability and validity.
21 (Kozminsky, 1988; Moss, 1982; Schmeck et al., 1991; Schmeck & Ribich, 1978).
22 The 44-item The Five Factor Model, often known as the Big Five Inventory (BFI)
23 (John et al.,1991), was used to measure the five primary categories of personality
24 traits. Additionally, with its strong factor structure, internal consistency, and short-
25 term test-retest reliability (Amabile, 1985; Watters, 2017; Amabile et al.,1994) the
26 30-item Work Preference Inventory (WPI) was used to assess motivation.

27

28 *The Inventory of Learning Processes (ILP)*

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30 The Inventory of Learning Processes is described by four factors (Schmeck et
31 al., 1991). Factor I, Synthesis and Analysis factor, consists of questions and
32 exercises that emphasize the evaluation, organization, differentiation, and
33 extrapolation of information includes the processing of information, the generation
34 of categories, and the structuring of those categories into hierarchies. (Komaraju
35 et al.,2011). Factor II, Study Methods reflects the use of methodical, time-tested
36 study strategies. Factor III, Fact Retention, contains items with substantial loadings
37 that show a preference for factual information and the ability to remember
38 specifics (Schmeck et al., 1977). Factor IV, Elaborative Processing factor, consists
39 of questions and sub-questions that emphasize visualizing, summarizing, relating,
40 encoding, and applying information (Schmeck et al.,1977). (see table 1). Using a
41 five-point continuous Likert scale, responses to statements range from (1) Strongly
42 disagree to (5) Strongly agree.

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1 **Table 1.** *The Inventory of Learning Processes (ILP) items and scales. (Schmeck*
 2 *et al., 1977).*

Scale	TOTAL Item	Items
Synthesis-analysis (SA)	18	1. I find it difficult to handle questions requiring comparison of different concepts/ 2. I have trouble making interferences/ 3. I have trouble organizing the information that I remember/ 4. Even when I know that I have carefully learned the material I have trouble remembering it for a exam/ 5. I find it difficult to handle questions requiring critical evaluation / 6. I do well on essay tests./ 7. I often have difficulty finding the right words for expressing my ideas. 8. I have difficulty learning how to study fir a course. 9/ I have difficulty planning work when confronted with a complex task. / 10. I get good grades on term papers /11. I often memorize material that I don`t understand./ 12. I have trouble seeing the difference between apparently similar ideas./ 13. I can usually state the underlying message of films and readings./ 14.I think fast. /15. Most of my instructors lecture too fast. / 16. I can usually formulate a god guess even when I don`t know the answer./17. I ignore conflicts between the information obtained from different sources. / 18. I read critically.
Study methods (SM)	23	1. I cram for exams/ 2. I have regularly weekly review periods./ 3. Getting myself to begin studying is usually difficult. 4. I review course material periodically during the term./ 5. I maintain a daily schedule of study hours. 6. I carefully complete all course assignments / 7. I generally write an outline of the material I read./ 8. I spend more time studying than most of my friends. /9. I prepare a set of notes integrating the information from all sources in a course. 10. I generally read beyond what is assigned in class./ 11. I usually refer to several sources in order to understand a concept. 12.toward the end of a course I prepare an overview of all material covered./ 13. I increase my vocabulary by building lists of new terms./14. I make frequent use of a dictionary. / 15. Even when I feel that I`ve learned the material I continue to study it. / 16. I make simple charts and diagrams to help me remember material. /17. I always make a special effort to get all the details. / 18. I work through practice exercises and sample problems. / 19. I have a regular place to study. / 20. I can easily locate particular passages in a textbook when necessary. / 21. I would rather read the original article than a summary of it. / 22. I frequently use the library. /23. When studying for an exam I prepare a list of probable questions and answers
Fact retention (FT)	7	1. I do well on exams requiring much factual information./2. I am very good at learning formulas, names and dates./3. I do well on tests requiring definitions./4. I do well on completion items. / 5. I have trouble remembering definitions. /6. My memory is actually pretty poor. / 7. For exams, I memorize the material as given in the text or class notes.
Elaborative processing (EP)	14	1. I look for reasons behind facts/ /2. New concepts usually make me think of many other similar concepts. / 3. While studying I attempt to find answers to questions I have read in mind./ 4. I am usually able to design procedures for solving problems. / 5. After reading a unut of material I sit and think about it for a while. / 6. I learn new words and ideas by visualizing a situation in which they occur / 7. When learning a unit of material I usually summarize it in my own words. / 8. I learn new concepts by expressing them in my own words. /9. I daydream about things I`ve studied. / 10. When I study something, I devise a system for recalling it later. / 11. I learn new words and ideas by associating them with words and ideas I already know. / 12. I learn new ideas by relating them to similar ideas. / 13. I try to convert facts into `rules of thumb`. / 14. When learning new concepts their practical applications often come to my mind.

3 SA= Synthesis-Analysis, SM= Study Methods, FR= Fact Retention, EP= Elaborative Processing
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5 The scale was translated from the English version in Schmeck et al. (1977)
 6 into Turkish by native speakers, then back-translated by another native Turkish

1 speaker, then compared to the English version by a native English speaker. Before
2 presenting the test to the students, translation errors were addressed.

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4 *The Work Preference Inventory (WPI)*

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6 The Work Preference Inventory (WPI), which was initially intended for
7 working people and updated for college students, consists of thirty questions to
8 measure individual variations in intrinsic and extrinsic motivation (Amabile et
9 al.,1994). 30 item scale WPI is divided into two domains: intrinsic and extrinsic
10 motivation.

11
12 **Table 2.** *The Work Preference Inventory (WPI) items and scales (Amabile et al.,*
13 *1994)*

Scale	Item Number	Items
Challenge (IM)	3 , 9R, 13, 14R, 26, 11, 5	3. The more difficult the problem, the more I enjoy trying to solve it./ 9R. I enjoy relatively simple, straightforward tasks. / 13. I enjoy tackling problems that are completely new to me./14 R. I prefer work I know I can do well over work that stretches my abilities. / 26. I enjoy trying to solve complex problems./ 11. Curiosity is the driving force behind much of what I do./ 5. I want my work to provide me with opportunities for increasing my knowledge and skills.
Enjoyment(IM)	7,17,27,28,8,20,30,23	7. I prefer to figure things out for myself./ 17. I'm more comfortable when I can set my own goals/ 27. It is important for me to have an outlet for self-expression/ 28. I want to find out how good I really can be at my work./ 8. No matter what the outcome of a project, I am satisfied if I feel I gained a new experience./ 20. It is important for me to be able to do what I most enjoy./ 30. What matters most to me is enjoying what I do./ 23. I enjoy doing work that is so absorbing that I forget about everything else.
Outward (EM)	1R , 15, 21, 24, 2, 18, 6, 29, 25,12	1R. I am not that concerned about what other people think of my work / 15. I'm concerned about how other people are going to react to my ideas./ 21. I prefer working on projects with clearly specified procedures/24. I am strongly motivated by the recognition I can earn from other people. / 2.I prefer having someone set clear goals for me in my work/18. I believe that there is no point in doing a good job if nobody else knows about it. / 6. To me, success means doing better than other people. / 29.I want other people to find out how good I really can be at my work./ 25. I have to feel that I'm earning something for what I do. /12. I'm less concerned with what work I do than what I get for it.
Compensation (EM)	4,10,16R,19,22R	4. I am keenly aware of the goals I have for getting good grades./ 10.I am keenly aware of the [GPA (grade point average) goals I have for myself./ 16 R. I seldom think about grades and awards./ 19. I am strongly motivated by the grades I can earn/ 22 R.As long as I can do what I enjoy, I'm not that concerned about exactly what grades or awards I can earn.

14 R= Reverse Coding IM= Intrinsic motivation EM= Extrinsic Motivation

15
16 Each domain has two subfactors: intrinsic motivation consists of seven items
17 pertaining to challenge and eight items pertaining to enjoyment; extrinsic
18 motivation consists of five items pertaining to compensation and ten items
19 pertaining to outward orientation. (see table 2) (Amabile, 1985; Greer & Levine,
20 1985). Extrinsic motivation which is associated to the anticipated social

1 acceptance and praises, and compensation is tied to material reward (Watters,
2 2017). Two-factor and four-factor models of the original instrument found strong
3 internal consistency across working adults and undergraduates (adult alphas varied
4 from 0.62 to 0.75; student alphas ranged from 0.71 to 0.79) (Robinson, et al.,
5 2014) . WPI scale was translated into Turkish from the English version in Amabile
6 et al. (1994) by native speakers, then back-translated by another native Turkish
7 speaker, and compared to the English version by a native English speaker. Prior to
8 administering the exam to the students, translation problems were rectified.
9 Statements are responded to by using a five-point continuous Likert scale, ranging
10 from (1) Strongly disagree to (5) Strongly agree.

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12 *Big Five Inventory (BFI)*

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14 The Big Five framework of personality characteristics, which was developed
15 by Costa and McCrae in 1992, has been widely recognized as a reliable and
16 efficient model for comprehending the connection between one's personality and a
17 variety of academic actions. (Goldberg, 1993; Komarraju et al. 2011; Siddiquei &
18 Khalid, 2018) . Big Five identified by openness, conscientiousness, extraversion,
19 agreeableness, and neuroticism (John et.al.,1991; McCrae & Costa, 1989; Watters,
20 2017). McCrae and Costa (1989) stated that the FFM of personality is an
21 empirical generalization on the correlation between personality characteristics.
22 The BFI is a revised version of the FFM (Watters, 2017) that consists of a 44-item
23 battery with five subscales reflecting five personality traits. Openness necessitates
24 uniqueness, inquisitiveness, and inventiveness. Extraversion is characterized by
25 talkativeness, boldness, and conscientiousness is characterized by carefulness,
26 liability, and responsibility and agreeableness is characterized by amenability,
27 good-temperedness, and personableness.

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29 The revised version of Five Factor Model (FFM), known as the Big Five
30 Inventory and adapted from (John et al., 1991), is a 44-item survey utilizing a five-
31 point Likert scale (from 1 = strongly disagree to 5 = strongly agree) with five
32 subscales representing the following five personality traits: extraversion,
33 agreeableness, conscientiousness, neuroticism, and openness. (see table 3). Certain
34 objects are scored backwards. The scale was translated from the English version in
35 Watters (2017) to Turkish by native speakers, then back-translated by another
36 native Turkish speaker, and compared with the English version by a native English
37 speaker. Before presenting the test to the students, translation errors were
38 addressed.

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1 **Table 3. Big Five model items and scale (Watters, 2017)**

Scale	Item Number	Items
Extraversion	1, 6R , 11, 16, 21R , 26, 31R , 36	1. is talkative / 6R. is reserved/11. is full of energy/16. generates a lot of enthusiasm / 21R. tends to be quiet /26. has an assertive personality / 31R. is sometimes shy, inhibited 36. is outgoing, sociable
Agreeableness	2R , 7, 12R , 17, 22, 27R , 32, 37R , 42	2R. tends to find fault with others/7. is helpful and unselfish with others/ 12R. starts quarrels with others/ 17. has a forgiving nature/ 22. is generally trusting/ 27R. can be cold and aloof/ 32. is considerate and kind to almost everyone/ 37R. is sometimes rude to others / 42. likes to cooperate with others
Conscientiousness	3, 8R , 13, 18R , 23R , 28, 33, 38, 43R	3. does a thorough job / 8R.can be somewhat careless / 13. is a reliable worker/ 18R. tends to be disorganized / 23R.tends to be lazy / 28.perseveres until the task is finished / 33. does things efficiently/ 38. makes plans and follows through with them / 43R. is easily distracted
Neuroticism	4, 9R , 14, 19, 24R , 29, 34R , 39	4. is depressed, blue / 9R.is relaxed, handles stress well/ 14. can be tense/ 19. worries a lot/ 24R. is emotionally stable, not easily upset/ 29. can be moody/ 34R.remains calm in tense situations/ 39. gets nervous easily
Openness	5, 10, 15, 20, 25, 30, 35R , 40, 41R , 44	5.is original, comes up with new ideas/ 10. is curious about many different things/ 15. is ingenious, a deep thinker / 20. has an active imagination/ 25. is inventive/ 30. values artistic, aesthetic experiences/ 35R. prefers work that is routine / 40. likes to reflect, play with ideas/ 41R. has few artistic interests/ 44. is sophisticated in art, music, or literature

2 R= Reverse Coding

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5 **Results**

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7 The mean score of each variable was determined, along with the highest mean
8 scores for learning process (elaborative processing), personality characteristics
9 (openness), and motivation (challenge) (mean=3,4248, mean=3,5460, and
10 mean=3,0375, respectively. (see table 4). In elaborative processing assessment
11 item 6 got the highest mean score (mean=4.34) (see table 4) (Item 6 ;`I learn new
12 words and ideas by visualizing a situation in which they occur`).

13 This result was consistent with the idea that, architectural student has the
14 ability to visualize ideas because of the architectural education system. Although
15 the majority of architecture schools include visualization as a "complementary"
16 ability to the study of architecture, it can be said that visualization is widely taught
17 in architecture programs (El Gammal, 2008). This result demonstrates that
18 students were able to employ elaborative thinking to identify features of idea
19 visualizations that might influence a shift in attitude, since these visuals foster
20 elaborative thinking while dealing with ideas. This conclusion is also similar with
21 Meier et al. (1984) explanations for the elaborative processing scale, which has
22 been connected to students' effectiveness in creative writing classes.

23 In personality traits, students identified openness; related to being original,
24 curious and creative as one of their featured personal characteristics (mean= 4.08).
25 In openness scale item 30 got the highest mean score (mean=4.06) (Item 30:I see
26 myself as someone who values artistic, aesthetic experiences) (see table 4).
27 Students identified themselves as individuals who value aesthetic and artistic

1 experiences, while architecture education teaches students how to construct
2 architectural designs that meet aesthetic and artistic requirements.

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4 **Table 4.** Descriptive statistics for items in learning styles, personality and
5 motivation

	ITEMS	Mean	Std. Deviation
LEARNING STYLES	SA	2.3332	.27911
	SM	2.9922	.51182
	FR	3.2888	.60304
	EP	3.4248	.28318
ELABORATIVE PROCESSING (EP)	Item_1	3.58	.673
	Item_2	3.56	.760
	Item_3	3.58	.883
	Item_4	3.74	.751
	Item_5	4.12	.849
	Item_6	4.34	.658
	Item_7	2.62	.855
	Item_8	2.98	1.020
	Item_9	4.14	.833
	Item_10	2.58	.758
	Item_11	3.32	.891
	Item_12	3.64	.964
	Item_13	2.62	.855
	Item_14	3.12	1.023
PERSONALITY TRAITS	EXT	2.3128	.29120
	AGG	2.8778	.59859
	CON	3.3070	.33683
	NEU	2.1821	.55211
	OPEN	3.5460	.41608
OPENNESS	ItemNo_44	3.16	1.076
	ItemNo_41	2.32	1.077
	ItemNo_40	4.08	.665
	ItemNo_35	2.94	.843
	ItemNo_30	4.06	.827
	ItemNo_25	3.56	.760
	ItemNo_20	3.68	.819
	ItemNo_15	3.78	.790
	ItemNo_10	4.04	.699
MOTIVATIONAL FACTORS	ItemNo_5	3.44	.837
	Intrinsic Motivation	3.0846	.40907
	Extrinsic Motivation	3.2436	.31084
	OU(EM)	3.0028	.57884
	CH (IM)	3.0375	.56743
	EN(IM)	2.9384	.65204
CHALLENGE	CO (EM)	2.9812	.63487
	ITEM_No3_	2.66	.939
	ITEM_No5	3.90	.303
	ITEM_No9	2.44	.884
	ITEM_No11	3.06	.867
	ITEM_No13	2.92	.724
	ITEM_No14	2.50	.863
	ITEM_No26	2.76	.870

6 SA= Synthesis-Analysis, SM= Study Methods, FR= Fact Retention, EP= Elaborative Processing

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8 In motivation measurement students got higher score in extrinsic motivation.
9 (mean=3.2436) (see table 4). The findings revealed that the extrinsic motivation of

1 students exceeds intrinsic motivation. Extrinsic motivation is the drive of
 2 individuals to perform their behavior depending on external factors. This means
 3 students were eager to get attention, receive rewards, or avoid criticism. (Ryan &
 4 Deci, 2000). On the contrary, students got the highest mean score in challenge in
 5 intrinsic motivation scale (mean=3,03) , and the item 5 in challenge scale has the
 6 highest mean score (mean=3,90) (see Table 4). (item 5= `I want my work to
 7 provide me with opportunities for increasing my knowledge and skills.`). This
 8 finding suggested that the learning style of architecture students related to the
 9 challenge considering debate around architectural education, which offers them
 10 the opportunity to increase their knowledge and skills.

11 Using SPSS v.29 and the Lilliefors-corrected K-S, the normality of the
 12 student test results was then determined. Mean ratings for the learning process,
 13 personality, and motivation supported the null hypothesis that data were normally
 14 distributed. Considering that the majority of results had a normal distribution, the
 15 parametric Pearson correlation coefficient analysis was used to assess the
 16 correlations between scores of the learning process, personality, and motivation.
 17 (see table 5) . The findings revealed a complex and interesting network of
 18 important interactions between learning processes. Among the learning process
 19 elaborative processing appeared to be the most influential, with significant
 20 relationships to two dimensions of motivation and two dimensions of personality.
 21 Elaborative processing (EP) strongly correlated with conscientiousness ($r = .714$,
 22 $p < .001$) and weakly correlated with openness ($r = .323$, $p = .022$). Also EP was
 23 strongly correlated with outward ($r = .600$, $p < .001$), and moderately correlated
 24 with challenge ($r = .454$, $p < .001$). Also, conscientiousness was strongly correlated
 25 with outward ($r = .883$, $p < .001$) (see table 5).

26 In descriptive analysis students got the highest score in originality and
 27 elaborative processing however the correlations were weak. Strong connections
 28 between EP, and outward suggested that students concerned about external factors
 29 like their marks or critics. In addition, strong associations between EP and
 30 conscientiousness revealed that students utilizing a deep learning strategy were
 31 conscientious when they participated in activities that emphasized grasping the
 32 hidden meaning. The modest correlation between EP and challenge revealed that
 33 architecture students are able to confront the open, complex, and flexible
 34 framework of architecture education. Among the learning process study methods
 35 have significant relationships to agreeableness and enjoyment of personality ($r =$
 36 $.557$, $p < .001$; $r = .550$, $p < .001$; respectively.) Additionally, extraversion appears to
 37 be positively correlated with two dimensions of learning process. Strongly
 38 associated with synthesis -analysis process and weakly associated with fact
 39 retention ($r = .876$, $p < .001$; $r = .393$, $p = .005$; respectively.). (see table 5). Study
 40 methods include systematic inquiry that focuses mostly on planned working
 41 patterns that are connected with agreeableness, which is defined by high-quality
 42 social connections and social support associated with trust, empathy, compassion,
 43 and contentment (Öztürk, 2021). It was obvious that student's adept in social
 44 relations saw themselves as organized and systematic. Extraverted students, who
 45 are outgoing, vivacious, and enthusiastic, were very active and impulsive during
 46 synthesis-analysis, but less active and pragmatic during retention. Highly

intriguing, neuroticism seems to be positively associated with two learning process aspects. Synthesis -analysis process and fact retention correlated with neuroticism; however, these correlations were weak. ($r = .338, p = .016$; $r = .393, p = .005$; respectively) (see table 5).

To verify the continued validity of the findings, a multiple regression analysis was undertaken on the variables. Using SPSS (version 29), four regression analyses were conducted to examine the associations between four kinds of learning styles, five personality factors, and motivation (see table 6). The hierarchical regression analyzed the association between learning techniques, the five personality characteristics, and four motivational variables.

Table 5. Correlations between personality traits, learning process and motivational factors

Pearson correlation coefficient			1	2	3	4	5	6	7	8	9	10	11	12
Learning Process	1. SA	Correlation Coefficient												
		Sig. (2-tailed)												
	2. SM	Correlation Coefficient	.348*											
		Sig. (2-tailed)	.013											
	3. FR	Correlation Coefficient	.562**	.348*										
		Sig. (2-tailed)	<.001	.013										
	4. EP	Correlation Coefficient	.101	.011	.149									
		Sig. (2-tailed)	.486	.938	.301									
Motivational Factors	5. EN (IM)	Correlation Coefficient	.241	.550**	.311*	.183								
		Sig. (2-tailed)	.092	<.001	.028	.203								
	6. OU(EM)	Correlation Coefficient	.039	-.075	.129	.600**	.114							
		Sig. (2-tailed)	.785	.606	.371	<.001	.431							
	7. CO(EM)	Correlation Coefficient	-.064	-.090	-.109	.273	.101	.441						
		Sig. (2-tailed)	.659	.533	.450	.055	.485	.001						
	8. CH (IM)	Correlation Coefficient	.041	-.064	.057	.454*	.249	.680**	.627**					
		Sig. (2-tailed)	.775	.658	.695	<.001	.081	<.001	<.001					
Personality Traits	9. EXT	Correlation Coefficient	.876*	.268	.515**	.202	.278	.157	.046	.240				
		Sig. (2-tailed)	<.001	.060	<.001	.159	.051	.276	.751	.156				
	10. AGG	Correlation Coefficient	.146	.557**	.064	-.071	.532**	-.128	-.046	.000	.118			
		Sig. (2-tailed)	.312	<.001	.658	.624	<.001	.375	.750	1.000	.415			
	11. CON	Correlation Coefficient	-.045	-.037	.065	.714**	.115	.883**	.444**	.624**	.043	-.137		
		Sig. (2-tailed)	.757	.796	.655	<.001	.427	<.001	.001	<.001	.768	.344		
	12. NEU	Correlation Coefficient	.338*	.241	.393**	.060	.383**	.054	-.017	.106	.405**	.141	.023	
		Sig. (2-tailed)	.016	.092	.005	.677	.006	.711	.904	.463	.003	.328	.875	
	13. OPEN	Correlation Coefficient	.227	-.016	.165	.323*	-.076	.291*	.196	.396**	.240	-.192	.288*	.082
		Sig. (2-tailed)	.112	.912	.252	.022	.599	.040	.173	.004	.093	.182	.043	.570

*. Correlation is significant at the 0.05 level (2-tailed) **. Correlation is significant at the 0.01 level (2-tailed) SA= Synthesis-Analysis, SM= Study Methods, FR= Fact Retention, EP= Elaborative Processing, EX= Extraversion, AGG= Agreeableness, CON= Conscientiousness, NEU= Neuroticism OPEN= Openness, OU(EM)= Outward (Extrinsic Motivation), CH (IM)= Challenge (Intrinsic Motivation), EN(IM)= Enjoyment (Intrinsic Motivation), CO(EM)= Compensation(Extrinsic Motivation)

1 The first analysis (Model 1) focused on the link between SA, five personality
 2 traits, and four motivation factors. The second analysis (Model 2) focused on the
 3 relation between SM, five personality traits, and four motivation factors. The third
 4 analysis (Model 3) examined, FR, five personality traits and four motivation
 5 factors. The fourth analysis (Model 4) examined EP, the five personality traits,
 6 and four motivation factors.

7
 8 **Table 6.** Summary of multiple regression analyses with the five factors of
 9 personality and motivation subscales as cross predictors and predictors of
 10 learning process

MODEL	Y= dependent variable	Predictors	Unstandardized b	t	p-value	F	R ²
1	Y= SA	EXT	.835	10.849	<.001**	30.906	.778
		AGG	.021	.601	.551		
		CON	-.076	-1.228	.226		
		NEU	-.012	-.306	.761		
		OPEN	.037	.706	.484		
		OU(EM)	.036	.252	.802		
		CH(IM)	.021	.117	.907		
		EN(IM)	.103	1.618	.113		
		CO(EM)	-.102	-.688	.495		
2	Y= SM	EXT	.274	1.145	.258	4.982	.361
		AGG	.456	4.245	<.001**		
		CON	.025	.128	.899		
		NEU	.091	.744	.461		
		OPEN	.044	.273	.786		
		OU(EM)	.007	.032	.974		
		CH(IM)	-.287	-1.028	.309		
		EN(IM)	.473	4.816	<.001**		
		CO(EM)	-.041	-.178	.859		
3	Y= FR	EXT	.859	2.925	.005*	3.932	.309
		AGG	-.005	-.036	.972		
		CON	.055	.232	.818		
		NEU	.243	1.612	.114		
		OPEN	.055	.274	.785		
		OU(EM)	.327	1.100	.277		
		CH(IM)	-.048	-.127	.899		
		EN(IM)	.293	2.213	.032		
		CO(EM)	-.372	-1.213	.232		
4	Y= EP	EXT	.155	1.394	.170	10.651	.548
		AGG	.012	.248	.805		
		CON	.575	6.434	<.001**		
		NEU	-.016	-.284	.778		
		OPEN	.065	.855	.397		
		OU(EM)	.411	3.442	.001*		
		CH(IM)	.050	.331	.742		
		EN(IM)	.046	.869	.389		
		CO(EM)	-.018	-.146	.885		

Note: * p<.005, **p<.001 SA= Synthesis-Analysis, SM= Study Methods, FR= Fact Retention, EP= Elaborative Processing, EX= Extraversion, AGG= Agreeableness, CON= Conscientiousness, NEU= Neuroticism OPEN= Openness, OU(EM)= Outward (Extrinsic Motivation), CH(IM)= Challenge (Intrinsic Motivation), EN(IM)= Enjoyment (Intrinsic Motivation), CO(EM)= Compensation(Extrinsic Motivation)

11
 12
 13
 14
 15 In all four analyses, four dimensions of learning process were the dependent
 16 variable. Using SPSS regression, the regression assumptions of linearity, homo-
 17 elasticity of residuals, and absence of outliers were examined. Table 6 displays the
 18 unstandardized b, the F and R2 associated with it, and the standardized regression
 19 coefficients. The regression coefficients of the five personality factors showed that
 20 only three variables (extraversion, agreeableness and conscientiousness) were

1 statistically significant. The regression coefficient of SA explained 77.8 percent of
2 the variance in EXT ($R^2 = 77.8, p < .001$). The regression coefficient of SM
3 explained 36.1 percent of the variance in AGG ($R^2 = 36.1, p < .001$). The
4 regression coefficient of SM also explained 34.7 percent of the variance in
5 EN(IM) ($R^2 = 34.7, p < .001$). Moreover, FR explained 30.9 percent of the variance
6 in EXT ($R^2 = 30.9, p = .005$). The regression coefficient of EP explained 54.8
7 percent of the variance in CON ($R^2 = 54.8, p < .001$). Likewise, the regression
8 coefficient of EP explained 37.5 percent of the variance in OU(EM) ($R^2 = 37.5,$
9 $p = .001$). (see table 6)

12 Discussion

14 The purpose of this study is to examine the relationships between learning
15 style and personality, and motivation among architecture students. Study found
16 that among the four learning styles elaborative processing has the highest mean
17 score. This finding indicated that architecture students are more adept at problem-
18 solving, idea production, making associations, visualizing, and remembering than
19 they are at synthesis-analysis, fact retention, and methods. As Schmeck and Ribich
20 (1978) noted, students with high scores on elaborative processing also had higher
21 scores on measures of intellectual curiosity and mental imagery. In fact, this
22 outcome was anticipated, given that the objective of architectural education is to
23 cultivate students' divergent thinking skills, i.e. their capacity to generate many
24 solutions in response to a given challenge and fostering mental imagery. In
25 personality traits, the greatest mean score for openness indicates that architecture
26 students gained the ability to generate unique ideas and were receptive to all types
27 of learning methodologies. On the motivation scale, students scored higher for
28 extrinsic motivation. The data indicated that students' extrinsic motivation
29 outweighs their intrinsic motivation. In general, extrinsic motivation defined as it
30 undermines the learner's perception of autonomy and decision freedom (Deci
31 & Ryan, 1991). Contrary to this idea, this research indicated that students with
32 extrinsic motivation were capable of elaborate thinking and more thorough and
33 meticulous about their tasks. The highest score on the intrinsic motivation scale for
34 challenge revealed that architecture students are able to confront complex issues
35 and are drawn to new challenges and experiences. This conclusion supports the
36 concept that architecture education has a complex structure as it requires students
37 to think unconventionally and out of the box. This encourages students to strive for
38 excellence in design methods that might push the limits of creation.

39 Additionally, elaborative processing was highly correlated with
40 conscientiousness and outward, weakly correlated with openness, and moderately
41 correlated with challenge. Moreover, conscientiousness and outward had strong
42 correlations. Conscientiousness defined as "socially commanded impulse control
43 that encourages task- and goal-directed conduct, such as thinking before acting,
44 delaying gratification, adhering to norms and rules, and planning, organizing, and
45 prioritizing tasks" (e.g., McCrae & Costa, 1989; John et al., 2008). Although,
46 conscientiousness is connected with profound and successful learning strategies

1 (Chamorro-Premuzic, et al., 2007), here it can be argued that conscientiousness
2 related to elaborative thinking where students using a deep learning approach
3 participate in actions that emphasize understanding the underlying meaning,
4 associating new concepts with old ones, and synthesizing the information critically
5 (Conrad & Patry, 2012). The correlation between elaborative learning and outward
6 as an extrinsic motivation subscale appears to be unrelated in a broad sense;
7 however, for educational settings, as Mills & Blankstein (2000) demonstrated,
8 students who put extremely high standards on themselves may be as driven by
9 extrinsic rewards (e.g., grades) and/or concerned with competition, appraisal, and
10 acknowledgment. The moderate correlation between EP and challenge also
11 demonstrated that architecture students are capable of addressing complicated
12 difficulties and are attracted to new experiences and challenges. Furthermore,
13 extraversion was strongly associated with synthesis -analysis process and weakly
14 associated with fact retention. Synthesis-analysis refers to the process of absorbing
15 information, creating categories, and organizing those categories into hierarchies.
16 From this point of view, extraverts, with the usual valence of perceived emotional
17 events, as well as typical stimuli sensitivities and response inclinations
18 (Bachorowski & Braaten, 1994), were more associated to information processing
19 and categorical thinking development. Significant associations exist between study
20 methods (SM) and agreeableness and enjoyment of personality. Study methods
21 include systematic inquiry that focuses mostly on planned working patterns that
22 are connected with agreeableness, which is defined by high-quality social
23 connections and social support associated with trust, empathy, compassion, and
24 contentment. Evidently, socially adept students saw themselves as organized and
25 meticulous. Similarly, extraverted students have a tendency to be social, energetic,
26 and enthusiastic, as well as assertive, very active and impulsive (Öztürk, 2021) in
27 the synthesis-analysis process, but less active and pragmatic in actual retention.
28 Two elements of the learning process seem to be positively linked with
29 neuroticism. However, the relationships between synthesis-analysis process and
30 fact retention and neuroticism were weak. This indicates that when students
31 experience fear or suffering, they do not lose their drive to study.

32 33 34 **Conclusion**

35
36 The main goal of this study to investigate the relationship between learning
37 styles, personality and motivation among architecture students. The data indicated
38 that the elaborative process, which was connected with conscientiousness and
39 challenge, was the governing learning style in architecture students. Architecture
40 students who were combative and conscientious, more competence in elaborative
41 thinking such as problem-solving, idea generation, establishing connections,
42 picturing, and remembering than in synthesis-analysis, fact retention, and study
43 methods. Furthermore, based on the lowest mean score, study methods depicted in
44 the ILP are incompatible with the way architecture students think. Since
45 systematic comprehension is the essence of study process, architecture students
46 often think instinctively rather than systematically. The way an architectural

1 student thinks and learns embraces complexity, analyses the current condition, and
2 theorizes a desired alternative state in contrast to contradictions.

3 In contrast to other disciplines, architectural education has a diverse,
4 adaptable, and elaborate framework concerning the personality traits of students
5 and their motives in studios. Students' personal characteristics, intrinsic and
6 extrinsic motivations may be taken into consideration in the educational process to
7 produce a more competent approach to architecture education. In this way, this
8 research highlights the significance of elaborative processing, a learning style in
9 which students excel, and focuses its significance in architectural education. It is
10 observed that students that are extremely open, competitive, conscientious, and
11 extraverted might be more effective in this learning environment. It is believed
12 that architectural educators who prepare instructional material with these features
13 in mind will achieve favourable outcomes.

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