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The Correlation Between Students' Big Five Personality (Introversion/Extroversion) and Learning Style

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A B S T R A C T

The relationship between personality and learning styles is critical for personalized education, yet findings on the link between introversion/extroversion and Visual-Auditory-Kinesthetic (VAK) styles remain contradictory. This quantitative study examined wheather or not these two variables has this correlation among 58 university students. Personality was assessed using an 8-item scale (scores 0–40), with scores ≤28 classified as introversion and ≥29 as extroversion. Learning style was measured via a 30-item VAK questionnaire. A Chi-square test of independence revealed no significant association ($\chi^2(2) = 3.125$, $p > .05$). The results indicate that sensory learning preferences are not statistically determined by the introversion/extroversion dichotomy in this context. Consequently, the study concludes that educators should move beyond personality-based style-matching and instead employ multimodal, flexible pedagogies that encourage metacognitive adaptation in diverse learners.

Keywords: *Learning Styles, Vak, Personality Traits, Introversion, Extroversion, Pesantren Education, Quantitative Correlation, Pedagogical Design*

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INTRODUCTION

The landscape of higher education is undergoing a profound transformation, shifting from a traditional, instructor-centric model to a learner-centered process that acknowledges students as active constructors of meaning, whose internal psychological characteristics critically influence engagement (Biggs, 1999; Schunk, 2012). Two key psychological domains in such frameworks are personality traits and preferred sensory learning modalities. Specifically, introversion (a tendency toward internal, reflective thought) and extraversion (a tendency toward outward, social engagement) are foundational dimensions within the robust Big Five personality taxonomy (McCrae & Costa, 2008). These traits are examined alongside the Visual-Auditory-Kinesthetic (VAK) model, a prevalent and practical framework for categorizing sensory learning preferences (Barbe et al., 1979). The VAK model was selected for this study due to its widespread application in educational settings, providing a direct and actionable lens for analyzing sensory-based instructional alignment. The core assumption is that underlying personality dispositions, like introversion/extraversion, help shape individuals' tendencies to prefer particular ways of processing information (Chamorro-Premuzic & Furnham, 2009; Zhang, 2003).

Investigating this linkage is pressing because a practical gap persists between instructional delivery and how students receive information (Pashler et al., 2008; Rohrer & Pashler, 2012). Standardized teaching often yields divergent outcomes, a variance that signals a misalignment between the instructional channel and the learner's innate cognitive and dispositional wiring. When content clashes with a student's predisposed learning preferences, consequences include cognitive overload, dwindling motivation, and fading material relevance. This recurring mismatch necessitates moving past generic techniques toward an

empirically grounded understanding of learners' internal characteristics (Vermunt & Vermetten, 2004; Pashler et al., 2008). Therefore, examining the relationship between introversion–extraversion and VAK preferences aims to support more nuanced, personalized pedagogical practices that acknowledge students' psychological diversity (Yunos et al., 2021; Zhang & Sternberg, 2006).

To engage meaningfully with this proposed correlation, a clear and nuanced deconstruction of each core construct is essential. The introversion–extraversion dimension is not merely an index of sociability but a basic axis that regulates how individuals orient themselves toward sources of energy, stimulation, and external experience. (Eysenck, 1991; McCrae & Costa, 2008). Introverted individuals typically direct their psychological energy inward rather than outward. (Eysenck, 1991; Laney, 2002). Those who are more introverted tend to derive stimulation and fulfillment from internal activities such as thinking, reflection, and sustained concentration. (Laney, 2002; Chamorro-Premuzic & Furnham, 2009). They often favor focused involvement in a smaller range of tasks or interactions and may feel drained in settings characterized by intense social contact and strong sensory stimulation. (Eysenck, 1991; Laney, 2002). Their information processing is usually careful, reflective, and internally oriented, with a tendency to prioritize depth rather than breadth. (Zhang, 2003; Chamorro-Premuzic & Furnham, 2009). In contrast, extraversion is associated with directing energy outward toward people and external events. (Eysenck, 1991; McCrae & Costa, 2008). Extraverted individuals tend to gain energy from engaging with others through social interaction, animated conversation, and diverse sensory experiences in their surroundings. (Eysenck, 1991; McCrae & Costa, 2008). They frequently treat thinking as a verbal and social activity, flourish in dynamic collaborative contexts, and are inclined to seek broad, interactive, and multisensory input. (Furnham, 2012; Komarraju & Karau, 2005). This foundational dichotomy in energy management and information processing suggests a compelling theoretical link to how individuals might naturally approach learning situations, predisposing them to favor educational environments and methods that align with their energetic and cognitive rhythms.

Parallel to this personality framework, the VAK model offers a structured lens for understanding these differing approaches to learning. The visual modality refers to a tendency to process information primarily via sight, using spatial layouts, graphs, diagrams, charts, and written materials. (Barbe et al., 1979; Fleming & Mills, 1992). Learners who favor visual input tend to build understanding by arranging information spatially and drawing on the symbolic and structural clarity offered by visual supports. (Setiawan et al., 2025; Gong et al., 2020). The auditory modality emphasizes learning via listening and spoken communication. (Barbe et al., 1979; Yunos et al., 2021). Students with auditory preferences tend to perform well in settings that provide lectures, discussions, debates, and verbal explanations, and they often consolidate understanding by speaking or engaging in dialogue. (Fleming & Mills, 1992; Yunos et al., 2021) . The kinesthetic modality is grounded in hands-on activity, bodily movement, and tactile interaction. (Barbe et al., 1979; Gong et al., 2020). Kinesthetic learners typically understand content best when they participate in practical tasks, experiments, movement-based work, role-plays, or direct manipulation of materials. (Setiawan et al., 2025; Gong et al., 2020). It is crucial to acknowledge that these modalities are not rigid, mutually exclusive categories but rather fluid preferences; most individuals utilize a blend, though often with a dominant channel that feels most natural and effective. The educational promise of acknowledging these styles lies not in pigeonholing students but in empowering educators to design multimodal, flexible instruction that can reach and resonate with a broader spectrum of cognitive preferences, thereby fostering a more inclusive and effective learning ecosystem.

The theoretical intersection where stable personality traits meet situational learning preferences is intellectually fertile yet empirically complex. A simple hypothesis could propose intuitive pairings, such as reflective introverts gravitating toward visually oriented learning situations that permit solitary engagement with texts or visual materials (Komarraju & Karau, 2005; De Raad & Schouwenburg, 1996). Conversely, socially energized extraverts might be expected to prefer interactive, discussion-based auditory environments such as

lectures and seminar debates (Furnham, 2012; Komarraju & Karau, 2005). The kinesthetic style, emphasizing action and embodied experience, may cut across this binary by appealing to learners' general desire for concrete engagement regardless of personality type (Gong et al., 2020; Setiawan et al., 2025).

However, these intuitive mappings are speculative and potentially reductive. Current scholarship presents mixed and contradictory findings. For instance, while studies like those by Furnham (2012) and Yunos et al. (2021) report some significant links between extraversion and collaborative or auditory learning, other research such as that by Pashler et al. (2008) finds weak or no evidence for such style-personality matches. More recent empirical studies, including Gong et al. (2020) and Setiawan et al. (2025), further complicate the picture by showing that learning modality preference is highly task- and context-dependent, often outweighing the influence of personality traits. This divergence arises partly because studies use different operational definitions, occur in diverse cultural settings, and treat personality and learning style as multifaceted constructs (Busato et al., 2000; Coffield et al., 2004).

This inquiry explicitly extends prior research by situating the investigation within the unique socio-pedagogical context of an Islamic science college with a *pesantren* tradition. This cultural and institutional setting differs markedly from the secular or Western university environments that dominate the existing literature, allowing this study to test whether previously hypothesized relationships hold in a context where pedagogical practices (e.g., emphasis on recitation, communal living) and cultural norms may fundamentally mediate the expression of both personality and learning style. Therefore, this study is positioned not to assert a deterministic relationship but to explore a potential tendency or pattern within this specific context, acknowledging the dynamic interplay between inherent disposition and adaptive behavior shaped by a distinct educational ecology.

The context for this exploration—the environment of an Islamic science college with a pesantren tradition—adds a rich layer of cultural and pedagogical specificity. This institutional context forms a unique educational ecology in which traditional modes of transmission—such as memorization, recitation, and communal study—intersect with contemporary scientific education. (Azra, 2013; Ramadhani, 2023). The residential, communal life of a pesantren, with its structured routines and emphasis on spiritual reflection, may cultivate and reinforce certain behavioral expressions of personality that differ from those in secular, non-residential universities. Likewise, the prominence of oral recitation and interpretive discourse in Islamic pedagogy may inherently enhance auditory processing skills in learners regardless of personality type. (Yunos et al., 2021; Gong et al., 2020) By situating the investigation within this defined context, the analysis necessarily moves beyond abstract psychological correlations to consider how educational culture, spiritual practice, and community life mediate the expression of both personality and learning preference. This approach recognizes that psychological constructs are not expressed in a vacuum but are continuously shaped and interpreted through cultural and institutional frameworks.

Pursuing this line of inquiry demands a critical and reflective scholarly posture. The core question extends beyond establishing whether a statistical correlation exists. It invites a deeper contemplation about the very nature of learning and individuality in educational settings. If a significant link is found, it prompts exploration into the underlying mechanisms—are they rooted in neurocognitive wiring, such as differences in cortical arousal and stimulus sensitivity often associated with introversion and extroversion? If a clear correlation is not established, the implications are equally profound. A null result could challenge oversimplified models that attempt to categorize learners into fixed types. (Coffield et al., 2004; Rohrer & Pashler, 2012). It might also underscore the influential role of instructional design and teacher scaffolding in activating or constraining particular learning channels irrespective of learners' innate dispositions. (Vermunt & Vermetten, 2004; Setiawan et al., 2025). The findings could further suggest that effective learning is fundamentally metacognitive, with successful students flexibly adapting their strategies to the demands of each task and selectively using visual, auditory, or kinesthetic approaches instead of relying on a fixed style. (Zimmerman, 2002; Zhang & Sternberg, 2006) This reflective analysis pushes the discourse past mere

diagnosis and toward a more dynamic understanding of learner agency and educational adaptability.

Ultimately, exploring the relationship between introversion–extraversion and VAK preferences goes beyond a purely statistical exercise in correlation. (Yunos et al., 2021). It contributes to broader debates on diversity, equity, and instructional effectiveness in higher education. (Pashler et al., 2008; Rohrer & Pashler, 2012). By examining this intersection, the study seeks to replace untested assumptions with evidence-based insight and to substitute broad generalizations with nuanced understanding. (Chamorro-Premuzic & Furnham, 2009). The goal is to arm educators and instructional designers with a more sophisticated understanding—one that appreciates the deep-seated dispositions students bring with them while also recognizing the transformative potential of a thoughtfully designed learning environment. The argument favors psychologically attuned classrooms that provide multiple entry points into content via rich visual materials, dialogic auditory activities, and kinesthetic experiences, thus engaging introverted reflectors, extraverted collaborators, and learners across the spectrum. (Setiawan et al., 2025; Vermunt & Vermetten, 2004). In doing so, this exploration advocates for an educational philosophy that does not seek to match a rigid profile to a fixed method, but rather cultivates flexible, responsive, and multidimensional learning spaces where all students can discover and harness their unique pathways to understanding.

METHOD

The investigation of the correlation between personality traits (introversion–extraversion) and VAK (Visual, Auditory, Kinesthetic) learning styles requires a methodological framework that combines precise measurement with critical awareness of its epistemological constraints. This study employs a quantitative descriptive-correlational design, chosen to identify and quantify possible associations between clearly defined psychological constructs without assuming causality. In line with standard practice in personality and learning research, correlational designs are considered appropriate for detecting patterns of co-variation between traits and learning variables in naturalistic educational settings (Busato et al., 2000; De Raad & Schouwenburg, 1996; Yunos et al., 2021). The design therefore aims at discovery and pattern recognition, while explicitly acknowledging that any observed correlation does not imply that personality causes a specific learning style or vice versa, as both may be influenced by additional variables such as neurological processes, cultural upbringing, and prior educational experiences (Eysenck, 1991; DeYoung et al., 2010).

Consistent with a descriptive-correlational approach, the study first produces a detailed descriptive profile of the sample on both key variables—personality and learning style—before applying statistical tests to examine the strength and direction of their relationship. To ensure a focused and contextually relevant sample, a purposive sampling technique was employed. This non-probability sampling method deliberately selects participants who possess specific characteristics relevant to the research question—in this case, sixth-semester students at an Islamic science college whose academic habits were considered well-established, providing a homogeneous and information-rich sample for an in-depth contextual analysis. The descriptive component outlines, for example, how learning style preferences are distributed and what proportion of the participants are classified as introverts or extraverts. This classification was determined by summing scores from an 8-item Likert-scale personality questionnaire (range 0-40). A theoretical midpoint of 24 was used as a reference, with scores ≤28 categorized as introversion and scores ≥29 categorized as extraversion, a dichotomization that facilitated categorical analysis while acknowledging the simplification of a continuous personality spectrum. The correlational component uses inferential statistics to test whether the observed pattern deviates significantly from what would be expected by chance. Such a two-stage procedure is widely used in educational psychology to ensure that interpretations of correlation are grounded in a clear understanding of the sample's characteristics (Busato et al., 2000; Chamorro-Premuzic & Furnham, 2009). To ensure the quality of measurement, the validity and reliability of the instruments were considered. The questionnaires were adapted

from established models in the literature to ensure content validity, and their internal consistency (reliability) was assessed prior to the main study to confirm that the items within each scale measured the intended construct cohesively.

Respondents

The target population of this research consists of undergraduate students enrolled at Campus Sains Islam Al Mawaddah Warrahmah Kolaka, an Islamic science college in Indonesia. This institution represents a distinctive socio-pedagogical environment in which contemporary academic curricula intersect with pesantren (Islamic boarding school) traditions that emphasize communal living, memorization, oral recitation, and discursive learning. Previous analyses of Islamic higher education suggest that such contexts can shape both the expression of personality traits and students' learning strategies in ways that differ from those found in secular or Western universities (Azra, 2013; Ramadhani, 2023). For instance, cultural norms that value reflection, quiet study, and respect for religious authority may influence self-reported introversion, while pedagogical practices centered on lecture and recitation may foster auditory learning tendencies across a wide range of dispositions.

The sample for this study comprises 58 sixth-semester students from the 2020–2021 cohort. A purposive sampling technique was employed to select participants who were at a similar academic stage, under the assumption that their learning habits and academic routines would be relatively established by this point in their studies. Ethical considerations were strictly observed; all participants provided informed consent prior to data collection, and their anonymity was ensured throughout the research process. Although this sample size is adequate for an initial correlational analysis using categorical variables, the relatively modest number of participants and the single-institution context limit the generalizability of the findings primarily to similar Islamic higher education settings in Indonesia. At the same time, this contextual specificity is a methodological strength, as it offers a culturally rich and controlled lens through which to examine the interaction between personality and learning style, complementing broader survey-type studies conducted in more heterogeneous contexts (Busato et al., 2000; Yunos et al., 2021).

Instruments

Translating abstract constructs into measurable variables is central to empirical research in personality and learning. Accordingly, this study used two self-report questionnaires: one to assess introversion–extraversion and another to identify VAK learning style preferences. Self-report inventories are commonly used in both personality and learning research because they allow large numbers of participants to be assessed efficiently; however, they also raise concerns about response bias and self-perception accuracy that must be acknowledged when interpreting results (Coffield et al., 2004; Schunk, 2012).

Introversion and extraversion were measured through an 8-item Likert-type questionnaire with response options ranging from 1 (Strongly disagree) to 5 (Strongly agree). The items were designed to capture central behavioral and cognitive features of the introversion–extraversion dimension, including preferred social environments, sources of psychological energy, and modes of reflection, in line with descriptions found in the trait-based personality literature (Eysenck, 1991; McCrae & Costa, 2008). For each participant, item responses were summed to yield a total score ranging from 0 to 40.

A theoretical midpoint of 24 points (corresponding to an average of 3.0 per item) was used as the reference point for classification. Participants with scores equal to or below 28 (average ≤ 3.5) were categorized as introverts, whereas those scoring 29 or above (average ≥ 3.6) were categorized as extraverts. This dichotomization produced a binary personality variable suitable for analysis via a Chi-square Test of Independence, even though it necessarily simplified the underlying personality continuum and omitted the "ambivert" range that many researchers argue is prevalent in general populations (Laney, 2002; Zhang, 2003). The choice to impose a binary classification is methodologically pragmatic in the context of categorical analysis but is recognized as a reduction of the nuanced spectrum of introversion–extraversion.

Preferred learning styles were assessed using a 30-item closed-response questionnaire with a four-point scale (1–4). Each item described a brief learning-related situation or preference regarding how information is received and processed, with items evenly distributed to represent visual, auditory, and kinesthetic modalities. This structure is consistent with modality-based instruments used in previous VAK-related studies, although the broader learning-styles literature has cautioned against over-reliance on such typologies without careful psychometric validation (Barbe et al., 1979; Coffield et al., 2004; Gong et al., 2020).

For each participant, scores were summed separately for the visual, auditory, and kinesthetic subscales. The modality with the highest total score was designated as the participant's primary learning style. Importantly, the instrument allowed for multimodal dominance: if two or three modality scores tied for the highest value, the participant was recorded as having multiple dominant styles and was counted in each corresponding category in the descriptive tables. This approach acknowledges that many learners employ a blended repertoire of strategies rather than a single fixed preference, aligning with critiques that emphasize the fluid and context-dependent nature of learning styles (Coffield et al., 2004; Vermunt & Vermetten, 2004).

Data Analysis

Data analysis comprised two main phases, progressing from descriptive statistics to inferential testing.

In the first phase, descriptive statistics were computed for both personality scores and VAK learning style scores. Measures of central tendency and distribution (such as mean, minimum, maximum, and percentage) were used to construct an overall profile of the sample. These descriptive results informed the development of cross-tabulation tables that summarized how many introverts and extraverts fell into each learning style category (visual, auditory, kinesthetic). Such descriptive overviews are not merely preliminary; they provide the first layer of insight regarding whether certain styles appear more prevalent or whether personality types seem evenly distributed across modalities, thereby guiding the interpretation of subsequent inferential tests (Busato et al., 2000; Setiawan et al., 2025).

To address the core research question concerning the relationship between personality type and preferred learning style, a Chi-square Test of Independence was employed. This non-parametric test is suitable when both variables are categorical—in this case, personality (introvert vs. extravert) and learning style (visual, auditory, kinesthetic)—and aims to determine whether the observed distribution of frequencies in a contingency table differs significantly from the distribution expected under the assumption of independence (Pallant, 2020; Schunk, 2012). The analysis involved calculating expected frequencies for each cell, computing the Chi-square statistic (χ^2) and degrees of freedom, and then comparing the obtained χ^2 value with the critical value at a 95% confidence level ($\alpha = .05$) to decide whether to reject or retain the null hypothesis of independence. The outcome of this procedure provides probabilistic evidence as to whether personality type and learning style preference are statistically associated or function independently in the sample, a question that has been central to recent empirical debates on learning styles and personality in higher education (Pashler et al., 2008; Yunos et al., 2021).

The methodological framework of this study is situated within a post-positivist paradigm that seeks objective measurement while acknowledging that all instruments and categorizations are theory-laden and imperfect. The reliance on self-report questionnaires introduces potential limitations such as social desirability bias and inaccuracies in self-assessment, which are commonly reported issues in both personality and learning-style research (Coffield et al., 2004; Schunk, 2012). Moreover, the combination of a binary personality classification with a multimodal learning style categorization creates an asymmetry in variable granularity; future research could extend this design by treating personality scores as continuous and by incorporating broader models of learning approaches beyond sensory modalities (e.g., Kolb's experiential learning or Felder–Silverman dimensions), which may show more theoretically coherent links with personality traits

(Busato et al., 2000; Zhang, 2003). Despite these constraints, the present methodology is intended to be rigorous, transparent, and critically self-aware, offering a structured empirical lens for examining how learners' introversion–extraversion and VAK preferences intersect within a culturally specific higher education context.

FINDINGS AND DISCUSSION

The empirical investigation into the correlation between personality traits (introversion/extroversion) and VAK (Visual, Auditory, Kinesthetic) learning styles culminated in a statistically unambiguous, yet intellectually provocative, central finding: there is no significant relationship between these two constructs within the studied population. The Chi-square test of independence, calculated from the contingency table of personality types across learning modalities, yielded a χ^2 value of 3.125 with 2 degrees of freedom. This result falls well below the critical value of 5.991 at the alpha 0.05 significance level, leading to the failure to reject the null hypothesis. In practical terms, this indicates that the observed distribution of individuals across the introversion-extroversion continuum into the categories of visual, auditory, and kinesthetic learning preferences does not differ significantly from the distribution expected by pure chance. Therefore, the probability of a learning style preference is independent of personality type in this dataset.

Deconstructing the Descriptive Landscape: Nuances within Non-Significance Before engaging with the null result's theoretical implications, a detailed examination of the descriptive data reveals subtle patterns that, while not statistically significant, offer rich qualitative texture to the findings.

A striking feature of the sample is the pronounced skew toward introversion, with 78% (45 of 58) of respondents classified as introverts. This disproportionate distribution immediately contextualizes all subsequent analyses and begs for a cultural and institutional interpretation rather than a purely psychological one. The setting—an Islamic science college with a *pesantren* tradition—may cultivate and reward dispositions aligned with introverted behaviors: introspection (*tafakkur*), disciplined solitary study, quiet respect for teachers, and a focus on internal spiritual states. Consequently, what is measured as "introversion" here may be a complex amalgam of innate personality and socially reinforced comportment. This high baseline of introversion means that any learning style will naturally have a majority of introverted adherents, which the data corroborates: introverts constitute 71% of visual learners, 87% of auditory learners, and 64% of kinesthetic learners.

The auditory learning style presents the most extreme distribution, with 87% of its practitioners being introverts. This finding directly counteracts the intuitive hypothesis that extroversion, with its affinity for verbal exchange and social interaction, would correlate strongly with an auditory preference. Instead, within this specific context, the auditory style appears to be the domain of the quiet listener rather than the vocal participant. This can be powerfully explained by the pedagogical heart of the *pesantren* tradition: the mastery of texts through careful listening (*sama'*) to the teacher (*kyai*), memorization (*hafalan*), and precise recitation. This form of auditory learning is not about discursive debate but about receptive, attentive, and often silent absorption—a mode perfectly suited to an introverted disposition. The auditory style, therefore, is not monolithic; its expression is culturally coded.

The kinesthetic modality showed the most balanced distribution between introverts (64%) and extroverts (36%), and the highest proportional representation of extroverts among the three styles. This suggests that physical, hands-on learning may serve as a convergent channel for expression. For an extrovert in an environment that may privilege quiet study, kinesthetic activities provide a legitimate outlet for energy and engagement. For an introvert, these activities can offer a focused, non-socially-draining form of experiential learning. The kinesthetic lab or workshop might thus function as a democratizing space in the learning ecology, where personality-based predispositions are less determinative of engagement.

The absence of a significant statistical correlation is not a narrative of failure but a catalyst for a deeper, more critical discussion about the nature of learning styles, personality, and educational theory.

A dominant, yet increasingly criticized, strand of educational practice advocates for diagnosing a student's learning style and matching instruction to it. This study's findings provide empirical counterpoint to a simplistic application of this hypothesis based on personality, aligning with studies like those of Pashler et al. (2008) and Rohrer & Pashler (2012) that challenge the efficacy of style-matching. However, these results contrast with other research, such as that by Furnham (2012) and Komarraju & Karau (2005), which have reported significant, though often weak, associations between personality and certain learning approaches. This contradiction in the literature underscores the complexity of the relationship. The non-significant result in this study may stem from several methodological and conceptual factors, including the specific sample size and cultural context, potential self-report bias in the instruments, and the possible oversimplification inherent in reducing learning to three sensory modalities (VAK). If a student's core personality trait does not predict their sensory learning preference, then efforts to tailor teaching *primarily* on the basis of such traits (e.g., "give group projects to extroverts, solitary reading to introverts") may be misguided. The data argues that an introvert is just as likely to benefit from a well-structured group activity (kinesthetic/auditory) as an extrovert is from a deep individual reading assignment (visual), provided the task is well-designed and meaningful. This liberates instructional design from deterministic profiling and refocuses it on cognitive task analysis—choosing the modality that best represents the structure of the knowledge itself.

The findings powerfully underscore that learning preference is a state more than a trait. While personality (introversion/extroversion) is considered a relatively stable trait, the preferred mode of learning appears highly malleable and context-dependent. The subject matter, the instructor's skill, the available resources, and the cultural rules of the classroom exert a force that can override innate dispositional leanings. A student might prefer visual learning in mathematics (for graphs and proofs) but strongly favor auditory learning in a Quranic recitation class or kinesthetic learning in a chemistry lab. This fluidity suggests that "learning style" is better conceptualized as a strategic preference employed in specific situations rather than a fixed, identity-defining characteristic. Students are not "visual learners" in an essential sense; they may strategically and successfully employ visual strategies when the task demands it.

The methodological choices themselves invite reflection on the null result. The binary forced-choice on personality (Introvert/Extrovert) erases the ambivert majority that likely exists in any population, potentially washing out subtler correlational signals. Similarly, while allowing for multimodal dominance was a strength, the VAK model itself is a limited slice of the learning theory pie. It ignores critical dimensions like sequential/global processing (Felder-Silverman model) or abstract/concrete experience (Kolb's model). It is possible that personality correlates more strongly with these *cognitive* dimensions of learning (e.g., introversion with reflective observation, extroversion with active experimentation) than with the *sensory* modalities of VAK. The null finding, therefore, may be specific to this particular theoretical coupling.

Returning to the study's specific context, the findings carry a distinct message for educators in similar institutions. The data rejects the assumption that the introverted-leaning student body necessarily requires a singular, quiet, text-based (visual) pedagogy. On the contrary, the strong showing of introverts in *all* modalities, including kinesthetic, argues for pedagogical diversification. Introducing more collaborative projects, laboratory work, simulations, and interactive discussions is not antithetical to the students' dispositions; in fact, it may provide essential complementary skills and engage different facets of their intelligence. The tradition of auditory learning should be preserved but not exclusive; it can be powerfully integrated with visual organizers and kinesthetic applications to create a holistic, multisensory learning experience that honors the complexity of all students, regardless of where they fall on the introversion-extroversion spectrum.

CONCLUSIONS

The ultimate conclusion from these findings and their discussion is not that personality and learning are unrelated, but that their relationship is non-deterministic, complex, and mediated by a host of situational and cultural factors. The quest for a simple diagnostic mapping—"this personality type learns best this way"—is revealed as a reductionist endeavor. Instead, this research argues for an agile and responsive pedagogy. It is important to acknowledge the study's limitations, which include a relatively small and context-specific sample size that restricts broader generalization, the use of self-report questionnaires which are subject to response bias, and a focus on a single personality dimension (introversion-extraversion) which does not capture the full spectrum of individual differences. To build upon this work, future research should employ larger and more diverse samples, mixed-method designs that combine surveys with qualitative interviews or observations, and multidimensional personality measures, such as the Big Five inventory, to explore more nuanced trait interactions. Educators should be encouraged to adopt three key principles in their teaching approach. First, they should teach to variability by designing lessons that assume every classroom contains a full spectrum of personality types and learning potentials. This involves creating multiple entry points—visual, auditory, and kinesthetic—and offering varied forms of engagement, such as individual, paired, and group activities. Second, educators should move beyond simply diagnosing learning styles and instead develop students' metacognitive awareness. This means teaching them about different modalities like VAK, empowering students to recognize the most effective strategies for specific tasks, and consciously strengthening their less-dominant skills to build cognitive flexibility. Finally, effective teaching requires contextualizing understanding by recognizing how cultural and institutional norms shape the expression of both personality and learning. Teachers must respond with sensitivity to these real-world contexts, not just rely on abstract psychological concepts. In sum, this study finds that while introversion may define where a student draws their energy from, it does not prescriptively dictate the sensory pathway through which they most effectively grasp the world of ideas. The bridge between who the learner is and how they learn is built not by fixed trait-style linkages, but by purposeful instructional design, cultural awareness, and the cultivation of strategic learning intelligence. This nuanced, non-significant finding ultimately points toward a more empowered and dynamic vision of both the student and the educational process.

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