

Mapping Introversion in Educational Personality Research: A Bibliometric Analysis

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Index Terms:

bibliometric analysis, introverted educators, personality traits, student learning, educational psychology

Abstract. Personality is a fundamental factor in shaping classroom dynamics, student engagement, and instructional paradigms, yet introversion remains a highly fragmented and peripheral topic within educational scholarship. This study systematically applies a macro-level bibliometric approach to map the latent environment of introversion in the context of the more general literature of teaching and learning. We performed a series of Boolean searches in the Scopus database to reach a final dataset of 753 peer-reviewed publications published from 2000 to 2025. We employed the VOS viewer tool for network visualization and algorithmic clustering to analyze publication trajectories, citation networks, and thematic intersections. Bibliographic coupling revealed five distinct clusters mapping the structural anchors of the field, dominated by research streams in psychological well-being, adaptive learning systems, and academic motivation. Concurrently, co-word analysis yielded four primary thematic networks. Keyword co-occurrence mapping demonstrates that while the literature is overwhelmingly structured around broad macro-level frameworks (n=353), introversion remains situated on the structural periphery (n=21). While this quantitative difference reflects the deliberate scope of our broader search strategy, it visually maps the degree to which introversion remains subsumed under generalized personality constructs in educational scholarship. This empirical difference suggests that educational research has tended to examine personality through broader constructs, with introversion receiving comparatively limited explicit attention. Obscuring the individualized teaching realities of introverted educators. In this paper, we bring these networks together through an integrative matrix to map the implicit embedding of introverted teaching qualities, including deliberate reflection, deep listening, and asynchronous digital mediation, within mainstream pedagogies. Ultimately, this research provides a structural framework for the conversion of introversion from a stigmatized variable to an explicitly acknowledged strength in the design of contemporary education.

Introduction

Personality is the fundamental shaping factor of the classroom environment, which affects the approach to instruction, the well-being of the teacher, and the overall quality of the relationships between the teacher and the students (Macovei et al., 2023; Zhang, 2022). Introversion and extraversion are considered normal variations in the functioning of human cognition and the use of psychological energy, and not deterministic measures of capacity or aptitude. Modern psychological models of personality, most notably the Five-Factor Model and Jungian analytical typology, take this approach. However, mainstream educational discourse and institutional performance rubrics are plagued by a deep-seated paradigm bias. Such extroverted qualities as high verbal immediacy, constant social visibility, and a highly animated physical presence are routinely operationalized as default benchmarks for instructional efficacy (Zhang, 2022). This institutional preference is indicative of the “Extrovert Ideal” in the sociological literature, an ideological construct deeply embedded in modern educational architecture. Western, highly collaborative pedagogical models systematically design contemporary classrooms as high-stimulation spaces that center around constant group work, vocal participation, and rapid-fire verbal discourse. Consequently, these structural arrangements may create occupational and

psychological barriers for some introverted educators whose dispositional characteristics differ from prevailing classroom expectations. As a result of this systemic bias, the distinct pedagogical strengths intrinsically linked to introverted educators—such as deliberate reflective practice, active, attentive listening, keen emotional attunement, and highly individualized student support—are infrequently assessed as independent variables. Instead, they are unseen and unexplored, hidden in larger macro-constructs such as emotional regulation, relational competence, classroom climate, and asynchronous digital pedagogy (Dang et al., 2025). Compounding this conceptual marginalization, the existing literature on teacher personality is highly fragmented and dispersed across isolated subfields, such as occupational burnout, classroom interaction, instructional rapport, affectivity, and learner engagement (Liu et al., 2022). As a result, a clear intellectual framework to chart the exact juncture of introversion and education has been hard to establish. Traditional narrative and systematic reviews may be less suited to revealing macro-level relationships across these structurally disparate subfields. They often fail to capture the underlying relationships between disconnected conceptual silos. In the present study, we seek to fill this gap in the methodological and theoretical field by using a more sophisticated bibliometric mapping method to systematically reveal the hidden thematic existence of introversive traits in the wider educational paradigms. In this study, we map the intellectual, social, and thematic taxonomy of the field by applying algorithmic bibliographic coupling and co-word analysis to a comprehensive dataset of Scopus-indexed publications. With this computational macro-lens, we follow the trajectories of publication and the networks of citations as they evolve over time to reveal stark structural gaps, ultimately providing an empirical roadmap towards genuine diversity and equity of personalities in contemporary educational research.

Methodology

Search Strategy

We searched publications using the following search string (Table 1) based on relevant keywords.

No	Keywords	Justification
1	"introvert*" OR "introversion" OR "introverted teacher*" OR "teacher introversion" OR "personality trait*" OR "introverted educator*"	To identify literature related to an introvert teacher
2	teacher* OR educator* OR instructor* OR faculty	To identify literature related to teacher
3	"student learning" OR learning OR achievement OR "academic performance" OR engagement OR motivation OR "learning outcome*" OR "classroom interaction" OR "student participation"	To identify literature related to student learning.

Table 1: Search string in Scopus database

Our dataset was collected from Scopus on May 30, 2026, due to its large multidisciplinary scope and rich citation and keyword information. Due to the lack of literature specifically on introverted teachers, we broadened our scope to examine how personality traits in general affect teaching and learning. This approach enabled us to capture introversion in the context of broader established personality frameworks.

The following search query was applied to the title, abstract, and keyword fields:

TITLE-ABS-KEY ((introvert*OR introversion OR extraversion OR "personality trait*" OR "personality type*") AND (teacher* OR educator* OR instructor* OR faculty) AND (learning OR "student learning" OR achievement OR "academic achievement" OR engagement OR motivation OR "learning outcome*"OR "classroom interaction" OR "student participation"))

Search Query Boundaries:

To capture the broader academic landscape in which introversion is discussed, the search query initially encompassed general terms alongside introversion-specific keywords. However, because Boolean OR logic permits records containing only generic terms (e.g., 'personality trait') to enter the dataset, generic keyword frequencies are partially a structural artifact of the query design. Accordingly, the analysis prioritizes introversion-centered co-occurrence clusters.

Dataset Justification and PRISMA Flowchart

Table 2 presents a detailed distribution of these major personality keywords.

Category	Occurrences	Analytical Interpretation
Personality Traits	353	Dominant conceptual foundation and structural backbone of the field.
Teachers	51	Core educational actor and primary subject examined in the literature.
Extraversion	31	Frequently examined comparative personality dimension.
Big Five Personality Framework	31	Major theoretical paradigm operationalized in personality research.
Introversion	21	Emerging, highly specialized, and comparatively underrepresented research theme.

Table 2: Representation of Introversion-Related Concepts in the Dataset

One of the important methodological challenges in this study is that the term “introversion” is not explicitly mentioned in educational literature. In recent studies on teacher characteristics, personality is mainly analyzed through a broader perspective such as the Big Five traits, emotional intelligence, communication styles, and socio-emotional skills (Jach et al., 2023; Dhillon & Kaur, 2023). Therefore, we expanded our search strategy to incorporate these broader personality frameworks, thus also encompassing introversion when studied in relation to constructs such as extraversion and learning behaviors. Rather than treating the peripheral frequency of introversion ($n = 21$) as an unexpected empirical discovery—given that our search strategy deliberately encompassed broad personality descriptors to ensure a sufficient dataset—this finding serves as a baseline structural map. It illustrates how introversive traits are currently conceptualized: not as an independent, standalone domain of educational inquiry, but as a minor sub-theme embedded within generalized personality research.

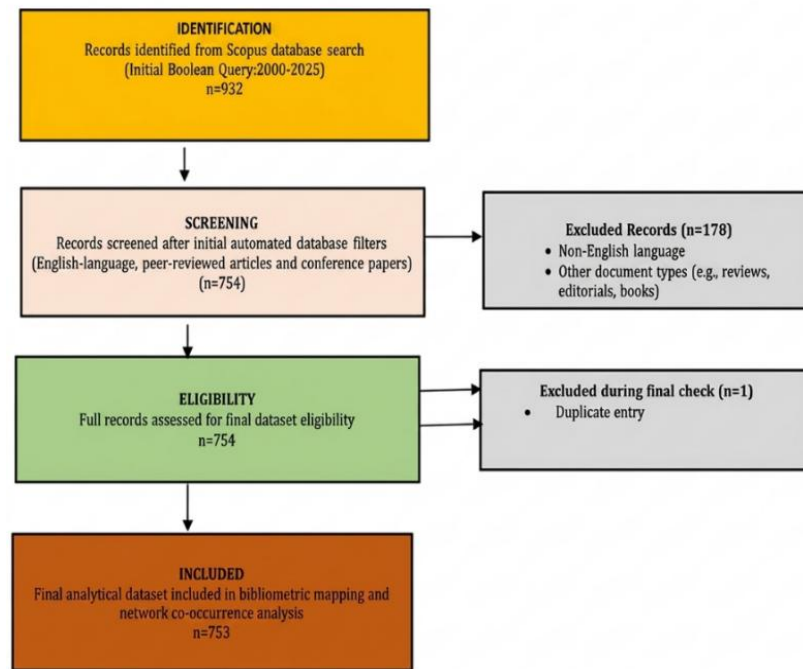


Figure 1: Flowchart for Cleaning Scopus Data

This study followed standard PRISMA reporting guidelines to ensure transparency and replicability. A systematic Boolean search was conducted in the Scopus database for literature published between 2000 and 2025, yielding 932 records. Automated filters for English-language publications and eligible document types (peer-reviewed journal articles and conference papers) excluded 178 records. The remaining 754 records were assessed for eligibility, with 1 duplicate removed, resulting in a final analytical corpus of $N = 753$ records. The systematic record selection process is presented in Figure 1.

Methodological Scope Note:

Though limiting the corpus to English-language articles indexed in Scopus guarantees computational quality and data consistency, this single-database and single-language restriction establishes a methodological boundary. As discussed in the Limitations, this constraint should be kept in mind when interpreting the peripheral occurrence of "introversion," as regional or non-English studies on quiet pedagogy were not captured.

Data Cleaning and Keyword Standardization

We have summarized this entire data-cleaning workflow in Figure 2. We systematically cleaned and standardized the keyword dataset prior to the analysis to ensure the bibliometric mapping was accurate and easy to interpret. We divided the process into four separate stages, in line with existing guidelines for bibliometric data-cleaning and keyword harmonization (Donthu et al., 2021; Lim et al., 2024). First, we filtered out non-thematic words, normalized synonymous keywords, created a dedicated thesaurus file, and finally validated the cleaned dataset. By taking these steps, we were able to eliminate duplication and improve consistency, leading to a much more reliable co-occurrence network.

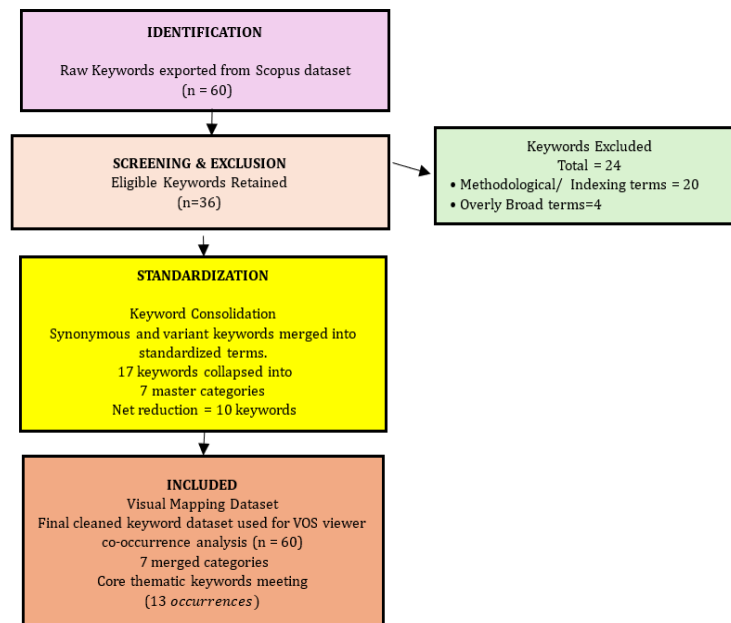


Figure 2: Flowchart for Keyword Cleaning and Standardization

Stage 1: Stripping Out Non-Thematic Terms

Several database-generated index terms that added little to our study's main themes were included in our original list. These included extremely general categories like education or psychology, certain research techniques like cross-sectional study or regression analysis, and fundamental demographics like adult, human, male, and female. These are eliminated because they describe how the studies are set up rather than the subjects that are being explored. By artificially increasing keyword counts and making the important thematic connections we truly want to uncover, leaving them in can distort co-word networks (Romanowski, 2025).

Stage 2: Merging and Standardizing Synonyms

We aggregated synonymous and closely similar keywords into a single, unified phrase to prevent the data from being fragmented. We grouped conceptually identical statements together and blended singular and plural forms. For example, "academic performance" and "academic achievement" were combined to produce Academic Achievement, and "student" and "students" became Students. In a similar vein, we combined "personality," "personality type," and "personality characteristics" into Personality Traits. By ensuring that our keyword counts accurately reflected the prominence of a study theme, we were able to produce a much cleaner and more consistent co-occurrence network (Klarin, 2024).

Keyword Harmonization and Construct Boundaries:

During the keyword cleaning stage, generic domain descriptors (e.g., 'personality type', 'personality characteristics') were consolidated into standardized umbrella terms (e.g., 'Personality Traits') to reduce semantic redundancy. Conversely, introversion-adjacent terms (such as 'shyness' or 'social reserve') were deliberately excluded from harmonization with 'introversion.' This decision was made to preserve psychological construct validity, as introversion represents a distinct preference for lower environmental stimulation rather than social anxiety or shyness. However, researchers should note that this asymmetric harmonization inherently results in higher aggregated occurrence counts for broad personality categories compared to specific, non-merged psychological constructs.

Stage 3: Building the Thesaurus File

To implement our cleaning and standardizing decisions, we created a special thesaurus file. The terms that should be removed, combined, or substituted with a preferred label were clearly stated in this file. In addition to correcting synonyms, we also combined similar ideas into more comprehensive and understandable categories, such as combining "e-learning," "educational computing," and "computer-aided instruction" into Educational Technology. The clarity, consistency, and general dependability of our co-word analysis were significantly enhanced by running the final network through this thesaurus (Romanowski, 2025).

Stage 4: Checking and Validating the Data

Lastly, we thoroughly examined the cleaned dataset to ensure that it was correct, consistent, and in line with our study objectives. While firmly eliminating unnecessary details, we took care to maintain any personality principles related to introversion, instruction, and student learning. By ensuring that our final co-word network highlighted actual research trends rather than database clutter or repetitive language, this additional check improved the robustness and interpretability of our bibliometric mapping (Öztürk et al., 2024). In the end, this painstaking refinement procedure optimized data integrity and simplified our entire analytical process.

Table 3 presents representative examples of the keyword cleaning and standardization procedures applied in the study.

Original Keyword	Action	Final Keyword
adult	Removed	—
human	Removed	—
cross-sectional study	Removed	—
regression analysis	Removed	—
student	Standardized	Students
teacher	Standardized	Teachers
academic performance	Merged	Academic Achievement
scholastic achievement	Merged	Academic Achievement
personality type	Merged	Personality Traits
personality characteristics	Merged	Personality Traits
educational computing	Consolidated	Educational Technology
computer-aided instruction	Consolidated	Educational Technology

Table 3. Representative Examples of Keyword Cleaning and Standardization

Bibliometric Analysis Procedure

We used VOSviewer (Version 1.6.20) for our bibliometric analysis. We employed it for co-word analyses and bibliographic coupling. We used a combination of two methods. To identify the main research streams, bibliographic coupling first grouped papers that shared common references. Second, we were able to identify dominant and emerging themes by a co-word analysis of author and index terms (Öztürk et al., 2024). We provided minimum thresholds to maintain the networks' readability. A minimum of 49 citations provided a balanced, unbroken network for bibliographic coupling, according to exploratory testing. As a result, we were only able to concentrate on 51 important texts, which naturally fell into five subject groupings. The spatial network was reduced to 60 core thematic words spread over four main clusters by applying a minimum of ≥ 13 occurrences to the standardized keyword thesaurus for the co-word analysis. We used the software's association strength normalization method to compute the linkages in order to guarantee mathematical accuracy throughout this process. These objects were grouped by VOSviewer according to the strength of their relationships. After carefully examining the representative papers and prevalent keywords, we gave each cluster a name. To identify important

research trends, knowledge gaps, and potential future paths for the study of personality, introversion, teaching, and learning, we finally examined these groupings.

Data Analysis and Parameter Selection

Co-word occurrence and bibliographic coupling analyses were performed using VOSviewer (association strength normalization). To balance network clarity with structural coverage, filtering thresholds were set to ≥ 13 occurrences for keyword co-word analysis and ≥ 49 citations for bibliographic coupling. These parameters were established through iterative testing to remove low-frequency peripheral terms, prevent visual oversaturation in network mapping, and isolate the top 60 core thematic keywords ($N = 60$) that define the foundational structure of the field.

Results and Discussion

The Scopus search was completed on May 30, 2026. Following the application of the screening criteria and the completion of data cleaning procedures, a final dataset of 753 papers on introverted teachers and student learning was kept for analysis.

Publication Trends

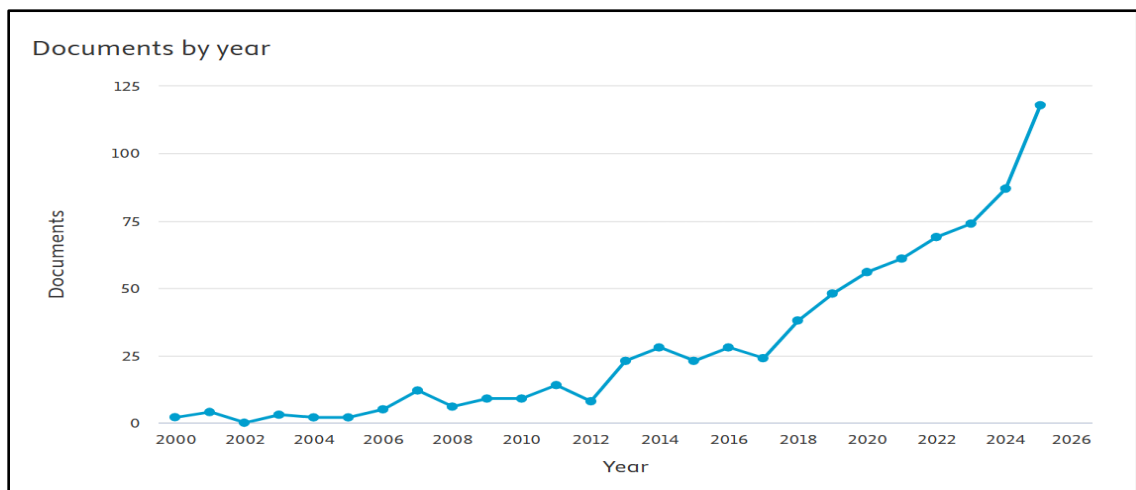


Figure 3: Annual Publication trajectory of Analyzed Research Results (2000–2025)
(source: Scopus)

Figure 3 illustrates the annual publication output and citation performance of research related to personality, teaching, and student learning from 2000 to 2025.

This literature's development takes place in three different stages. Low, erratic publishing production characterized the first phase (2000–2010), which was an emerging stage. Here, research concentrated on fundamental subjects such as academic success, learning styles, communication practices, and personality factors. However, the discipline lacked significant thematic cohesion because these studies were dispersed across communication, education, and psychology. Growth was consistent during the second period (2011–2018). Researchers started making direct connections between personality traits and educational outcomes such as teacher effectiveness, academic engagement, emotional intelligence, and student motivation. Learner-centered pedagogies and the widespread use of the Five-Factor Model were major factors in this expansion. Additionally, academics have been able to investigate how personality influences learning in both traditional and digital contexts because of advancements in educational technology. As scholarly interest in individual variations increased, the third phase (2019–2025) saw fast expansion and diversification, with publication production peaking in 2025. By combining educational psychology with digital instruction, research themes expanded into positive psychology, emotional well-being, adaptive learning systems, artificial intelligence in education, and online learning. These publication trends are reflected in citation patterns, which demonstrate that the expanding body of work is receiving significant scholarly attention. The intellectual foundation of the discipline is formed by highly referenced research that regularly concentrates on personality traits, academic achievement, motivation, creativity, and educational technology. Interestingly, compared to more general frameworks, there is still a dearth of specific studies on introversion despite this enormous development.

Bibliographic Coupling Analysis

Fifty-one of our 753 documents met the minimum threshold of 49 citations. Table 4 presents the top 15 most frequently cited documents in the dataset, ranked by citation count alongside their respective Total Link Strength (TLS). The top cited papers are led by Wang et al. (2021) with 708 citations, followed by Komarraju et al. (2009) with 468 citations, and Rocca (2010) with 361 citations. However, when examining structural connectivity, Komarraju et al. (2009) commands the largest network influence with a TLS of 33, highlighting a key distinction between global citation impact and localized network centrality.

Rank	Publication	Citation	Total link strength
1.	Wang, Y., Derakhshan, A., & Zhang, L. J. (2021). Researching lesson burnout and teacher engagement in the positive psychology movement: The role of emotional intelligence and resilience. <i>Frontiers in Psychology</i> , 12, Article 687712. https://doi.org/10.3389/fpsyg.2021.687712	708	7
2.	Komarraju, M., Karau, S. J., & Schmeck, R. R. (2009). Role of the Big Five personality traits in predicting college students' academic motivation and achievement. <i>Learning and Individual Differences</i> , 19(1), 47–52. https://doi.org/10.1016/j.lindif.2008.07.001	468	33
3.	Rocca, K. A. (2010). Student participation in the college classroom: An extended multidisciplinary literature review. <i>Communication Education</i> , 59(2), 185–213. https://doi.org/10.1080/03634520903505936	361	2
4.	Twenge, J. M. (2009). Generational changes and their impact in the classroom: Teaching Generation Me. <i>Medical Education</i> , 43(5), 398–405. https://doi.org/10.1111/j.1365-2923.2009.03310.x	281	8
5.	Almohammadi, K., Hagra, H., Alghazzawi, D., & Aldabbagh, G. (2017). A survey of artificial intelligence techniques employed for adaptive educational systems within e-learning platforms. <i>Journal of Artificial Intelligence and Soft Computing Research</i> , 7(1), 47–64. https://doi.org/10.1515/jaiscr-2017-0004	268	1
6.	Lee, J., & Stankov, L. (2018). Non-cognitive predictors of academic achievement: Evidence from TIMSS and PISA. <i>Learning and Individual Differences</i> , 65, 50–64. https://doi.org/10.1016/j.lindif.2018.05.009	150	18
7.	Horng, J.-S., Hong, J.-C., ChanLin, L.-J., Chang, S.-H., & Chu, H.-C. (2005). Creative teachers and creative teaching strategies. <i>International Journal of Consumer Studies</i> , 29(4), 352–358. https://doi.org/10.1111/j.1470-6431.2005.00445.x	149	8
8.	Wu, T.-T., & Wu, Y.-T. (2020). Applying project-based learning and SCAMPER teaching strategies in engineering education to explore the influence of creativity on cognition, personal motivation, and personality traits. <i>Thinking Skills and Creativity</i> , 35, Article 100631. https://doi.org/10.1016/j.tsc.2020.100631	148	8
9.	Klobas, J. E., McGill, T. J., Moghavvemi, S., & Paramanathan, T. (2018). Compulsive YouTube usage: A comparison of use motivation and personality effects. <i>Computers in Human Behavior</i> , 87, 129–139. https://doi.org/10.1016/j.chb.2018.05.038	148	16
10.	Chan, S., & Yuen, M. (2014). Personal and environmental factors affecting teachers' creativity-fostering practices in Hong Kong. <i>Thinking Skills and Creativity</i> , 12, 69–77. https://doi.org/10.1016/j.tsc.2014.02.003	140	6
11.	Asendorpf, J. B., & Van Aken, M. A. G. (2003). Validity of Big Five personality judgments in childhood: A 9-year longitudinal study. <i>European Journal of Personality</i> , 17(1), 1–17. https://doi.org/10.1002/per.460	132	11
12.	Di Giunta, L., Alessandri, G., Gerbino, M., Luengo Kanacri, P., Zuffianò, A., & Caprara, G. V. (2013). The determinants of scholastic achievement: The contribution of personality traits, self-esteem, and academic self-efficacy. <i>Learning and Individual Differences</i> , 27, 102–108. https://doi.org/10.1016/j.lindif.2013.07.006	131	31
13.	Mestre, J. M., Guil, R., Lopes, P. N., Salovey, P., & Gil-Olarte, P. (2006). Emotional intelligence and social and academic adaptation to school. <i>Psicothema</i> , 18(Suppl. 1), 112–117.	123	3

14	Weber, M., Wagner, L., & Ruch, W. (2016). Positive feelings at school: On the relationships between students' character strengths, school-related affect, and school functioning. <i>Journal of Happiness Studies</i> , 17(1), 341–355. https://doi.org/10.1007/s10902-014-9597-1	118	9
15	Nostro, A. D., Müller, V. I., Varikuti, D. P., Pläschke, R. N., Hoffstaedter, F., Langner, R., Patil, K. R., & Eickhoff, S. B. (2018). Predicting personality from network-based resting-state functional connectivity. <i>Brain Structure and Function</i> , 223(6), 2699–2719. https://doi.org/10.1007/s00429-018-1651-z	118	8

Table 4: Top 15 Documents in Bibliographic Coupling.

The non-linear relationship between a document's global citation count and its Total Link Strength (TLS) inside the localized dataset is a noteworthy structural feature of this bibliographic coupling network. Wang et al. (2021), for example, has the largest worldwide citation effect (708 citations), but its local connection strength is limited to a TLS of 7. On the other hand, although having a smaller global citation footprint (468 citations), Komarraju et al. (2009) commands the largest structural influence in the network with a TLS of 33. This difference is methodologically relevant since Wang et al. (2021) serve as a structural "intellectual island" or a macro-level bridge because bibliographic coupling establishes link strength depending on the number of common references across documents. It shares very few extremely specific references with the closely clustered, empirical teaching-and-personality studies that form the fundamental backbone of this network since it is a broad-scope, sweeping review paper that pulls from global positive psychology and second language acquisition research. The reference list of Komarraju et al. (2009), on the other hand, is highly specialized around the Big Five personality traits and direct educational results, creating a thick web of shared citations with the other 50 core publications in this dataset, making it an intellectual anchor.

The bibliographic coupling network visualization is shown in Figure 4.

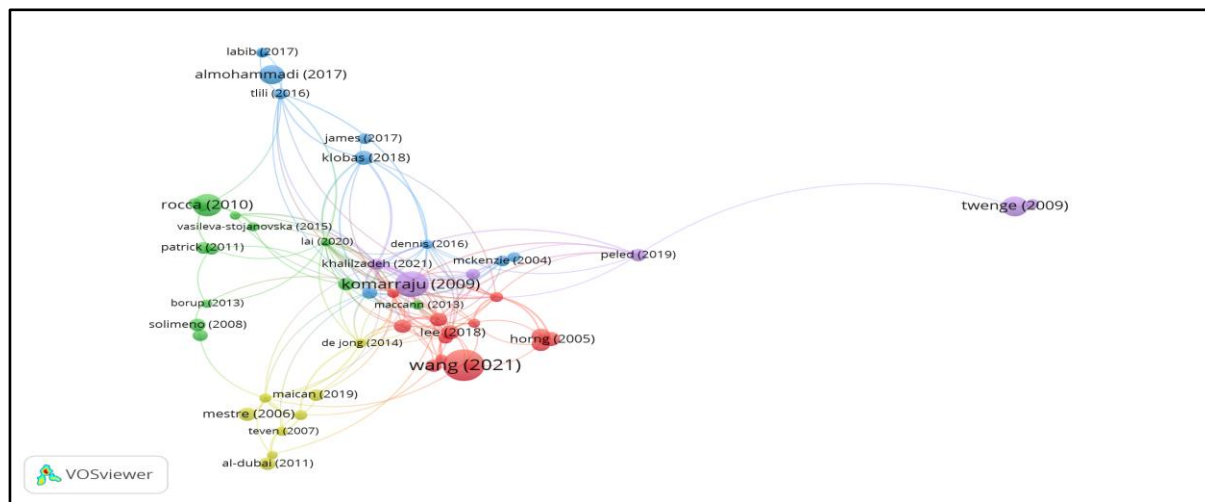


Figure 4: Bibliographic coupling of introvert teacher and student learning

It is evident that the five clusters are apart from each other. The tendencies and future directions of introverted teaching and learning are covered in the following. By reexamining example publications and conferences within the clusters, the clusters are labeled using inductive interpretation and synthesized based on shared themes and research streams. By analyzing representative articles and combining common themes, conceptual focus, and changing research trajectories, the clusters were identified by inductive interpretation.

Psychological Traits, Well-Being, and Creative Dispositions in Learning

According to Cluster 1, learning success is not just based on cognitive ability but also on personality and positive psychological resources. The studies emphasize that self-efficacy, emotional well-being, character strengths, and creativity shape how students engage with learning and achieve academically. This reflects a broader movement toward integrating cognitive and socio-emotional dimensions of education. Recent evidence shows that personality traits contribute to achievement through motivation, engagement, and identity development, while self-esteem remains a strong predictor of performance (Wang et al., 2023; Acosta-Gonzaga, 2023). The cluster also highlights the reciprocal influence of teacher

characteristics on student outcomes. Creative instruction is associated with teachers' personal orientations and their capacity to foster innovation in the classroom (Hornig et al., 2005; Chan & Yuen, 2014). Contemporary research further demonstrates that positive teacher personality traits enhance instructional quality, resilience, and professional well-being, thereby improving students' learning experiences and supporting effective teaching (Zhang, 2024; Samfira & Dughi, 2023).

Personality, Communication, and the Foundations of Introversion

Cluster 2 examines personality as a complex construct reflected in communication behaviors and underlying psychological processes. Rather than focusing on teaching strategies or academic performance, these studies explain why individuals communicate, process information, and interact differently. This perspective is particularly important for understanding introversion in educational settings because it challenges assumptions that equate quietness with disengagement or ineffectiveness. Evidence indicates that teachers' personality traits are closely associated with their communication effectiveness, suggesting that classroom interactions are shaped by enduring personal characteristics rather than instructional techniques alone (Dhillon & Kaur, 2023). Contemporary personality research further links introversion and extraversion to distinct cognitive, emotional, and neurological processes, with studies demonstrating measurable associations between personality traits and brain functioning (Quirin et al., 2022; Yoon et al., 2022). Collectively, these findings provide a conceptual basis for understanding how introverted teachers' dispositional characteristics may influence their professional practices while reinforcing personality diversity as a valuable asset in education rather than a limitation.

Personality, Technology, and Adaptive Learning Environments

Cluster 3 examines the interaction between personality and technology-enhanced learning, challenging the assumption that digital learning environments are experienced uniformly by all learners. Instead, the studies demonstrate that engagement with educational technology is shaped by learners' psychological characteristics, motivations, and preferences, reflecting a shift from one-size-fits-all approaches to personalized learning. While early AI-driven adaptive systems primarily customized content and feedback, recent research shows that personality influences how learners navigate online environments, select resources, and interact with digital content (Tlili et al., 2023). Consequently, effective personalization requires integrating psychological characteristics alongside academic performance. Personality-based recommendation systems have been shown to enhance student engagement, underscoring the value of incorporating educational psychology into AI-supported learning (Cardenas Canto et al., 2024). Likewise, AI-enabled adaptive learning systems improve achievement, engagement, and learning efficiency when personalization is embedded in instructional design (du Plooy et al., 2024). These findings suggest that digital platforms can provide reflective and flexible learning environments that align well with introverted teaching and learning preferences.

Emotional Intelligence and Educational Adaptation

Cluster 4 highlights emotional intelligence (EI) as a key determinant of academic adaptation and success. Unlike research streams centered on stable personality traits, communication styles, or technological interventions, this cluster emphasizes the ability to perceive, understand, regulate, and use emotions to foster positive learning experiences. It reflects the view that learning is not solely a cognitive process but is also shaped by emotional and social factors. Recent evidence supports this perspective, demonstrating that EI significantly enhances academic achievement and social relationships across diverse educational settings (Ding et al., 2024). This cluster underscores how emotional competencies shape students' responses to academic stress, relationship building, and everyday school challenges. By strengthening self-regulation, resilience, and psychological well-being, EI serves as a bridge between personal characteristics and educational outcomes. Likewise, recent findings show that high EI strengthens teacher-student relationships, increases engagement, reduces burnout, and improves academic performance (Li & Zhang, 2024). From this perspective, effective teaching is defined less by extroverted behaviors such as high energy or social assertiveness and more by the capacity to recognize students' emotional needs and cultivate supportive learning environments. These competencies align closely with the strengths often associated with introverted teachers, including active listening, emotional sensitivity, and reflective practice.

Student Personality, Motivation, and Generational Learning Characteristics

Cluster 5 considers the impact of long-lasting personality traits and wider generational shifts on student learning. Unlike those clustered around teachers or technology, this body of work focuses on the student as an active player, whose attitudes and academic behaviors are formed by personal attributes and an evolving culture. One key takeaway here is that cognitive ability alone can't explain grades. Personality traits influence the way students approach tasks, put in effort, respond to setbacks, and maintain motivation. These findings support the idea that personality is the psychological basis of academic grit. But these traits are not in a vacuum – they operate within social and cultural environments that shape what students expect from their education. Bringing generational perspectives into the mix opens the conversation and reminds us that today's students are molded by rapid social and technological change. This suggests a double sensitivity in teaching today,

sensitivity to the individual differences of personality and sensitivity to the common experiences of contemporary student cohorts.

Table 5 gives a comprehensive view of this bibliographic coupling analysis, including cluster number, color, thematic label, number of publications, and major representative papers.

Cluster No and colour	Cluster label	Number of publications	Representative publication
1 (red)	Psychological Traits, Well-Being, and Creative Dispositions in Learning	14	Wang Y, Derakhshan A and Zhang LJ (2021), Lee, J., & Stankov, L. (2018), Horng, J.-S., Hong, J.-C., ChanLin, L.-J., Chang, S.-H., & Chu, H.-C. (2005), Wu, T.-T., & Wu, Y.-T. (2020), Chan, S., & Yuen, M. (2014), Asendorpf, J. B., & Van Aken, M. A. G. (2003), Di Giunta, L., Alessandri, G., Gerbino, M., Luengo Kanacri, P., Zuffianò, A., & Caprara, G. V. (2013), Weber, M., Wagner, L., & Ruch, W. (2016)
2 (green)	Personality, Communication, and the Foundations of Introversion	13	Rocca, K. A. (2010), Nostro, A. D., Müller, V. I., Varikuti, D. P., Pläschke, R. N., Hoffstaedter, F., Langner, R., Patil, K. R., & Eickhoff, S. B. (2018).
3 (blue)	Personality, Technology, and Adaptive Learning Environments	10	Almohammadi, K., Hagra, S., Alghazzawi, D., & Aldabbagh, G. (2017), Klobas, J. E., McGill, T. J., Moghavi, S., & Paramanathan, T. (2018)
4 (yellow)	Emotional Intelligence and Educational Adaptation	8	Mestre, J. M., Guil, R., Lopes, P. N., Salovey, P., & Gil-Orlante, P. (2006).
5 (purple)	Student Personality, Motivation, and Generational Learning Characteristics	6	Komaraju (2009), Twenge (2009)

Table 5: Summary Matrix of Bibliographic Coupling Clusters.

Co-word analysis

We chose a subset of the first 60 keywords from Scopus that occurred at least 13 times and met our thematic screening. This yielded a co-word network in four clusters. The top five leading networks are “personality traits” (353 occurrences), “students” (159), “education technology” (88), “teachers” (51), and “engineering education” (39).

Rank	Keyword	Occurrences	Total link strength
1.	Personality traits	353	1498
2.	Students	159	1008
3.	Education technology	88	379
4.	teachers	51	371
5.	Engineering education	39	132
6.	Learning systems	34	131
7.	Higher education	33	71
8.	Big five	31	101
9.	Medical students	45	474
10.	Medical education	25	229
11.	Academic achievement	96	594
12.	motivation	68	331
13.	Learning styles	32	156
14.	extraversion	31	273
15.	introversion	21	164

Table 6: Top 15 keywords in the co-occurrence of keywords analysis

Figure 5 shows the co-word analysis network structure. It clearly shows four groups of four different themes. The four clusters are given the appropriate names based on the author's inductive interpretation.

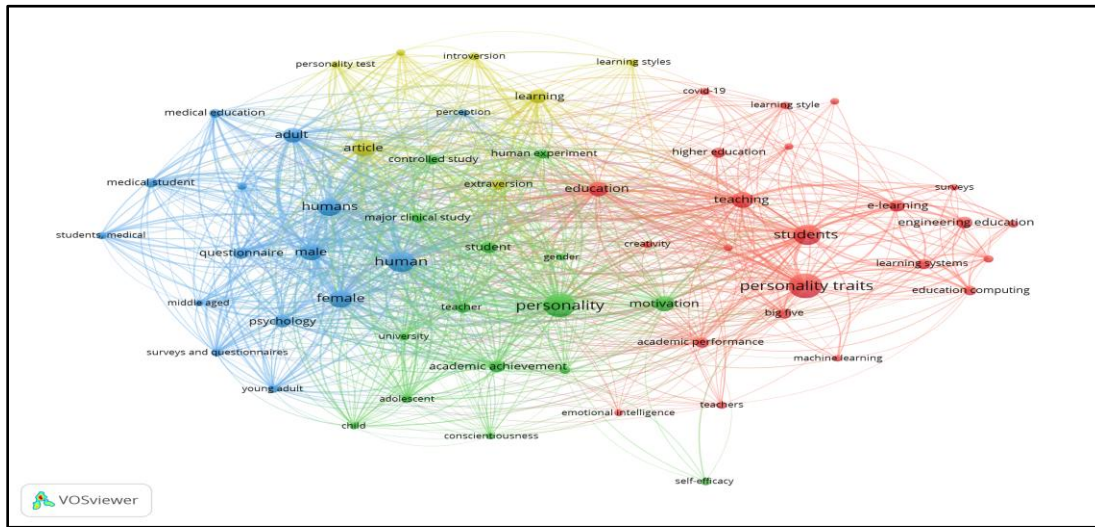


Figure 5: Co-word analysis on Introvert Teacher and Student Learning
Source: Researcher findings

Personality-Informed Learning Systems and Technology-Enhanced Higher Education

The first cluster is about how personality traits can be a linchpin in optimizing teaching and learning in tech-driven higher education. The clustering of keywords such as personality traits, Big Five, students, teachers, learning systems, and educational technology suggests an increasing awareness of the need for great education to be based not only on pedagogical strategies but also on the psychological profiles of students and teachers. At its core, this cluster is part of a broader trend toward personalized, adaptive learning. The prominence of the Big Five framework suggests that personality is increasingly conceptualized as a key factor underlying differences in student communication, self-regulation, engagement, and learning preferences. Rather than treating students and teachers as homogeneous groups, this literature advocates educational systems that are built around heterogeneous psychological profiles. These various interaction patterns eventually assist developers in designing adaptive learning systems that are sensitive to individual preferences (Tlili et al., 2023). The merging of learning systems with educational technology illustrates the convergence of personality psychology and smart instructional design. The co-word network appears to reflect a shift toward viewing digital classrooms as adaptive learning environments that can be tailored to diverse learner characteristics.

Professional Identity Formation and Learner Development in Medical Education

The second cluster, with the keyword's medical students and medical education, is a highly specialized yet influential research track investigating the ways that intense training environments influence future healthcare professionals. This cluster has fewer keywords, but the conceptual heft is huge. It recognizes that medical school is about far more than memorizing science and clinical checklists. In terms of our main interest in introverted teachers and student learning, medical education provides a unique setting to observe the interaction of personality and learning. Extraverted traits have long been prized in medical training, with their emphasis on teamwork, quick patient interactions, and constant clinic communication. But today's research challenges the old assumption that great healthcare professionals must fit one, booming interpersonal mold. The formation of identity is now viewed as fluid and influenced by personal characteristics, emotional experiences, mentorship, and the educational culture in which it occurs (Lönn et al., 2023). This change also allows for an appreciation of how the reflective, observant, and highly analytical tendencies—classic introverted strengths—can translate into incredible clinical competence. The focus on medical students also underscores an abiding concern with how schools instill flexibility and mental toughness in high-stress environments.

Motivational Pathways to Academic Success

The third cluster, characterized by academic achievement and motivation, centers on the psychological processes that drive educational success. The close association between these themes suggests that contemporary research no longer views achievement as a product of intellectual ability alone but as the outcome of students' motivation, engagement, persistence,

and self-regulation. Recent evidence identifies motivation as one of the strongest predictors of academic performance because it determines the effort, persistence, and strategic learning behaviors students invest in academic tasks (Howard et al., 2023). Thus, motivation functions as the bridge between students' potential and actual achievement. Although the studies in this cluster do not explicitly examine introverted teachers, they offer theoretical insights relevant to this review. Research consistently demonstrates that supportive teacher-student relationships enhance learners' motivation and academic success (Wang & Eccles, 2024). Introverted teachers may foster these conditions by emphasizing reflective learning, individualized feedback, autonomy, and meaningful one-to-one interactions rather than highly stimulating classroom environments. Such practices can strengthen students' intrinsic motivation and independent learning, creating pathways to sustained academic achievement. Consequently, this cluster provides an important conceptual foundation by identifying the motivational mechanisms through which teacher characteristics, including introverted teaching approaches, may indirectly influence student success, while highlighting a promising direction for future research.

Personality-Oriented Learning Preferences and Educational Interaction

The fourth cluster, represented by learning styles, extraversion, and introversion, examines how personality shapes learning processes and educational engagement. Unlike clusters that emphasize achievement or technology, this research stream focuses on how individual differences influence participation, communication, and learning preferences. The close association of these keywords suggests that learning is increasingly understood as the interaction between cognitive abilities and personality characteristics rather than academic ability alone. This cluster revisits the enduring question of how introversion and extraversion affect students' learning experiences. Evidence from online learning further demonstrates that personality influences learners' engagement patterns and navigation of digital environments, showing that meaningful participation extends beyond visible classroom interaction (Tlili et al., 2023). These findings are particularly relevant for introverted educators and learners, as they highlight the importance of aligning instructional approaches with diverse personality traits. Contemporary research likewise confirms that personality significantly shapes educational behaviors and learning experiences, reinforcing the need for more inclusive teaching practices (Zhang et al., 2024).

Table 7 provides a summary of the results obtained from the co-word analysis, which include cluster number and color, clusters' names, numbers of keywords, and some representative keywords.

Cluster No and color	Cluster label	Number of keywords	Representative Keywords
1 (red)	Personality-Informed Learning Systems and Technology-Enhanced Higher Education	23	Personality traits, students, education technology, teachers, engineering education, learning systems, higher education, big five
2 (blue)	Professional Identity Formation and Learner Development in Medical Education	15	Medical students, medical education
3 (green)	Motivational Pathways to Academic Success	15	Academic achievement, motivation
4 (yellow)	Personality-Oriented Learning Preferences and Educational Interaction	7	Learning styles, extraversion, introversion

Table 7: Summary Matrix of Co-word Analysis Clusters.

Introversion as a Peripheral Yet Emerging Research Theme

One of the findings obtained from this co-word analysis was the infrequent use of the term "introversion" in literature related to education. The term "personality traits" topped the list, appearing 353 times, while "introversion" appeared just 21 times, and "extraversion" appeared 31 times. From this finding, one can conclude that although personality is an established research field, its dimensions have not been sufficiently explored (Meyer & Jansen, 2023). This is the reason why, at the start, we faced difficulties collecting data. The search query "Introverted Teacher" produced very few results for any significant bibliometric analysis. Therefore, we had to expand our search criteria, considering that introversion was incorporated into wider topics such as communication, emotional intelligence, and motivation. This lack of keyword frequency shows how big a knowledge gap there is, which means that there are many possibilities for future research. More papers on introverted teachers influencing class atmosphere, learning process, and teaching methodologies must be written.

Discussion

While our bibliometric mapping and science visualization offer an overall quantitative perspective into the dynamics between personality and education, the true value of these tools comes from identifying the underlying patterns for introverted educators. While academic literature on "introverted teachers" may be rather sparse, our analysis demonstrates that introversion-specific characteristics are indeed well represented within the field of educational research.

Reframing Classroom Climate and Effectiveness (Cluster 1)

Cluster 1 focuses on the intersection between teacher personality, pedagogical effectiveness, and classroom environment. Traditionally, schools have assumed that effective teaching involves the "extroverted ideal" with loud energy, constant talking, and an imposing physical presence in the classroom. In contrast, this cluster highlights the importance of creating a welcoming and safe environment, as well as the necessity for structure. Therefore, introverted teachers can see that a "quiet footprint" is an effective pedagogical strategy, rather than a shortcoming. Rather than emphasizing highly verbal classroom interactions, introverted educators may leverage active listening and observational skills to foster lower-stimulation learning environments that could benefit some students, particularly those who prefer reflective forms of engagement.

Cognitive Scaffolding and Learning Strategies (Cluster 2)

Cluster 2 concerns the interplay between personality characteristics, cognitive activity, academic performance, and learning methods. The results reveal that instructional design is not neutral but rather depends on personality types. Although extroverted teaching approaches emphasize the use of quick and highly interactive group sessions, Cluster 2 emphasizes the importance of reflection, self-regulation, and mental structuring. It aligns with the personality preferences of introverted teachers who prefer concentrating and focusing internally on the task. The literature synthesized in this cluster suggests that introverted educators may be more inclined to design instructional activities emphasizing independent work, reflective reading, and self-regulated learning. Hence, introversion is conducive to effective strategies for promoting understanding.

Technology-Mediated Learning as an Equalizing Space (Cluster 3)

Cluster 3 is concerned with online learning and the use of digital pedagogy. The shift from traditional classrooms to a digital environment represents equality of a different sort, one more appropriate for introverted educators. Classroom settings imply non-stop social engagement; however, digital tools relieve introverts from the constant need to communicate and engage socially. Introverts excel when it comes to analytical and detailed communication, writing skills, and careful planning. Cluster 3 points to the potential of technology-enhanced learning environments for allowing such an introverted approach.

Professional Well-Being and Vulnerability to Burnout (Cluster 4)

Cluster 4 addresses the problem of the emotional pressure, stress, and well-being of those teachers who operate within intensive school settings. Modern schools are exceptionally noisy, over-stimulating, and sociable. The literature represented in this cluster suggests that sustained exposure to highly stimulating social environments may increase the risk of emotional exhaustion among some introverted teachers, although further empirical research is needed to clarify this relationship. Contrary to extraverts, introverts do not get energized but are exhausted by socializing; thus, Cluster 4 suggests an important role of institutional measures aimed at protecting introverted teachers from becoming victims of burnout and leaving the job.

Emotional Intelligence and Relational Regulation (Cluster 5)

This cluster interprets emotional intelligence (EI) as one of the fundamental components of teaching, namely empathy, emotional regulation, and heightened relational skills. Unlike their extroverted peers, introverted teachers are not prone to using boisterous enthusiasm in their activities but, rather, use emotional intelligence through being mindful, listening attentively, and noticing even the slightest emotions in their students.

Synthesis

The bibliometric mapping reveals an interesting pattern. Although relatively few studies explicitly investigate introverted teachers, several dominant research themes—including classroom climate, reflective learning, emotional intelligence, burnout, and technology-enhanced learning—appear conceptually related to characteristics commonly associated with

introversion. Rather than indicating that introversion constitutes an established research domain, these findings suggest that introversion is more often embedded within broader educational personality research and is rarely examined as an independent focus. This pattern highlights a potential gap in the literature and points to opportunities for future research that explicitly investigates the role of introversion in educational settings.

Mainstream Pedagogical Dynamic	Traditional Extroverted Lens	Re-framed Introverted Asset
Classroom Climate	High verbal immediacy, visible excitement	Low-stimulation safety, active listening
Instructional Design	Fast-paced collaborative group work	Structured reflective pathways, deep processing
Communication Modality	Real-time verbal discourse	Asynchronous digital/written feedback channels

Conclusion and Implications

Theoretical Implications

The results of this research's bibliometric mapping have several important implications for education-related research. Firstly, the results prove a paradigm shift in which personality is introduced into research and recognized as a very essential model of analyzing education, going beyond cognition. Secondly, there is a trend toward increased interdisciplinarity in the field, integrating theories related to educational psychology, communication, digital learning, and professional training. This overlap indicates the necessity of developing a comprehensive theoretical framework. Thirdly, our quantitative keyword analysis illustrates a striking structural asymmetry in the literature. While macro-level personality theories receive overwhelmingly dominant attention ($n = 353$), introversion remains structurally marginalized on the absolute periphery of educational research ($n = 21$). It becomes evident that there is an urgent need to develop explicit theoretical frameworks describing how introversion specifically influences instructional practices and classroom dynamics. Lastly, there is an observable acceleration of technology adoption and, thus, development of theoretical models incorporating personality differences impacting user engagement and workload.

Practical Implications

In addition to its contributions to theory, this research provides practical recommendations for the field of education. Firstly, the training of teachers needs to be adjusted to account for differences in individual personalities and abandon the misconception about there being a "correct" teaching disposition. The curriculum should facilitate the development of self-awareness and allow pre-service teachers to take advantage of their quieter disposition within a variety of settings. Simultaneously, the administration should reconsider assessment criteria to accommodate different teaching styles. Quiet and careful planning and communication are equally as effective as enthusiasm. Secondly, the curriculum needs to shift focus from exclusively extroverted and stimulating assignments and include a balance of collaboration and individual work, along with reflective assignments. Thirdly, researchers developing educational technologies should factor in these psychological findings when creating new algorithms. Instead of basing programs on a single standard for interaction, they should design flexible software that facilitates not only highly stimulating but also very quiet activities.

Limitations

There are several intrinsic methodological limitations that need to be considered. To begin with, the literature database was created using only one repository, namely Scopus. Of course, it is quite extensive, but future investigations should use other databases such as Web of Science and ERIC for incorporating unique and region-specific literature on quiet pedagogical techniques. Secondly, the search methodology was limited to articles published in English, which means that some valuable contributions of other cultures were not included in this study. Thirdly, since the term 'introverted teachers' is semantically rare, a more general approach needs to be applied to the analysis. Though this approach made it possible to discover new topics (such as general motivation and educational technologies), it was critical for identifying the areas of the knowledge space where introversion-related characteristics exist. Besides, bibliographic maps trace publishing and citation patterns and thus do not assess empirical qualities of studies. Lastly, this data set reflects the static state of things up until 2025.

Methodological Limitations

A limitation of this study stems from the initial Boolean search structure, where broad personality terms were combined with introversion-specific terms via OR operators. This generated a higher baseline occurrence for generic personality descriptors. Future bibliometric mappings exclusively targeting introversion may benefit from restricting initial queries strictly to introversion-derived root terms.

Harmonization Asymmetry:

Another limitation relates to the keyword harmonization protocol. Broad personality descriptors were merged into consolidated nodes to improve network readability, whereas introversion was strictly defined without absorbing related constructs (e.g., shyness, quietness). While this maintains conceptual precision, it contributes to an expanded frequency baseline for generic personality clusters relative to introversion-specific nodes."

Future Research Directions

Structural weaknesses highlighted in the extant literature provide a number of promising avenues to be explored during future empirical research. Specifically, fieldwork needs to be conducted, wherein introverted teachers would be followed longitudinally within their K–12 classrooms, observing how they cope with classroom management issues, relationship building, and student performance. Second, due to the growing prevalence of hybrid instruction, the differences between introverted and extraverted educators' adjustment to digital asynchronous teaching need to be investigated. Third, due to systemic oral bias that exists in the domain of education, empirical data is required in relation to how silent teachers use other means of communication besides speech to keep students engaged. Additionally, researchers should rely on mixed methods to examine the psychological mechanisms used by introverted teachers for promoting self-regulation and grit among students. Finally, cross-cultural comparisons are required to determine how the global differences in attitudes to educational authority affect the lives of introverted teachers.

Conclusion

The research analyzed the historical and topical development of studies on personality, teaching, and learning based on 753 articles indexed by Scopus between 2000 and 2025. Based on bibliographic coupling and co-citation techniques, we noted a steady development over the past two decades and watched the field become more interdisciplinary, covering topics related to well-being, motivation, achievement, and education technology.

One notable finding is the comparatively limited explicit attention given to introversion within the broader educational personality literature. Despite the key role that "personality characteristics" play in educational research as a core topic, introversion itself is still marginal. The reason for this can be found in previous researchers' preference for a wide and generalized concept of personality or a narrow focus on obvious extraversion in classrooms.

As modern education becomes increasingly personalized and technological, further research in this promising area is crucial.

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Appendices

No appendices are attached to this study.