

IDENTIFICATION OF THE USE OF PLAGIARISM DETECTION SOFTWARE AND ITS ROLE IN DEVELOPING ACADEMIC INTEGRITY

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DOI: <http://doi.org/10.5281/zenodo.20590454>

Received	Accepted	Published
03 December 2025	13 January 2026	28 January 2026

ABSTRACT

Academic integrity remains a critical concern in higher education, particularly in the digital era where access to online resources and AI-assisted tools has increased opportunities for plagiarism. This study investigates students' awareness of plagiarism detection software (PDS), its perceived effectiveness, and its role in promoting academic integrity within Pakistani universities. Employing a quantitative cross-sectional survey design, data were collected from 100 undergraduate students through a structured five-point Likert-scale questionnaire. The study examined three key constructs: awareness of plagiarism detection software, academic integrity behaviour, and perceived effectiveness of PDS. The findings reveal a high level of student awareness regarding plagiarism detection tools such as Turnitin and iThenticate ($M = 3.90$), accompanied by positive academic integrity behaviour ($M = 3.50$) and favourable perceptions of PDS effectiveness ($M = 3.50$). Students generally acknowledged that plagiarism detection software encourages originality, strengthens accountability, and discourages academic misconduct. However, the results also identified notable challenges, including limited use of similarity reports as learning tools, reluctance to report instances of peer plagiarism, and concerns regarding the fairness and accuracy of plagiarism detection algorithms. The study concludes that plagiarism detection software can significantly contribute to fostering academic integrity when implemented as part of a broader educational strategy. Technology alone is insufficient to ensure ethical academic conduct; rather, its effectiveness depends on integration with academic integrity training, ethics education, faculty support, and transparent institutional policies. The findings offer practical implications for university administrators, educators, and policymakers seeking to strengthen academic integrity practices in Pakistani higher education institutions.

Keywords: Plagiarism Detection Software, Academic Integrity, Turnitin, Higher Education, Academic Honesty, Pakistani Universities, Digital Plagiarism.

1. Introduction

The integrity of academic work is a cornerstone of higher education. When students and researchers submit original contributions, they participate in the broader project of advancing human knowledge. Plagiarism which is the act

of presenting another person's ideas, words, or work as one's own without proper attribution to fundamentally undermines this project. Beyond its ethical dimensions, plagiarism devalues the qualifications of honest students and damages the reputation of academic

institutions. In the digital age, the scale and ease of plagiarism have expanded dramatically. Search engines, online article repositories, and AI-assisted writing tools have created an environment where copying content requires minimal effort, yet the potential consequences – academic failure, suspension, or permanent damage to one's professional reputation – remain severe. Academic institutions have therefore increasingly turned to plagiarism detection software (PDS) as a technological response to this challenge.

1.1 Background of the Research

Plagiarism detection software operates by comparing a submitted document against vast databases of academic papers, journal articles, websites, and previously submitted student work. Systems such as Turnitin, iThenticate, and Copyleaks generate similarity reports that flag matching content, providing educators with a quantitative basis for investigating potential misconduct. In Pakistan, where higher education has expanded considerably over the past two decades, the adoption of such tools has been uneven. Some private universities have integrated Turnitin into their submission systems, while many public institutions continue to rely on manual checking or honour-based policies. This disparity creates inconsistent standards of academic integrity across the sector. The Higher Education Commission (HEC) of Pakistan has issued guidelines encouraging the use of plagiarism detection tools, particularly for thesis and dissertation submissions. Nevertheless, student-level understanding of these tools, and the extent to which

encountering PDS actually changes academic behaviour, remains insufficiently studied. This research seeks to address that gap directly.

1.2 Problem Statement

Despite the growing institutional adoption of plagiarism detection software in Pakistani universities, several important questions remain unanswered. It is unclear how aware undergraduate students are of the existence, purpose, and mechanisms of PDS tools. More critically, there is limited empirical evidence on whether student exposure to PDS translates into genuine improvement in academic integrity behavior that is, whether students adopt more conscientious citation practices, produce more original work, and internalize ethical norms as a result of knowing their submissions will be checked. Without this understanding, institutions cannot determine whether PDS deployment alone is a sufficient intervention, or whether it must be supplemented by targeted ethics education and faculty training.

1.3 Research Questions

This study is guided by the following research questions:

1. What is the level of awareness of plagiarism detection software among undergraduate students at Pakistani universities?
2. To what extent does exposure to PDS influence academic integrity behavior among students?
3. How do students perceive the effectiveness of PDS in promoting academic integrity?

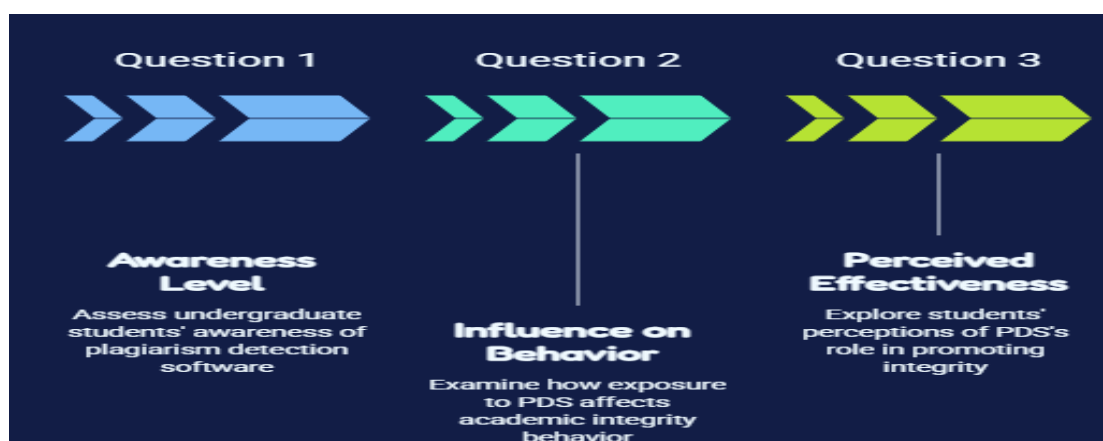


Figure 1. Research Questions

1.4 Hypotheses

1. H1: Students with higher awareness of PDS demonstrate stronger academic integrity behaviour.
2. H01: PDS awareness has no significant relationship with academic integrity behaviour.
3. H2: Higher perceived effectiveness of PDS is positively associated with academic integrity behaviour.
4. H02: Perceived effectiveness of PDS has no significant effect on academic integrity behaviour.

1.5 Significance of the Study

This study contributes to the literature in several ways. Theoretically, it applies the Knowledge–Attitude–Behaviour (KAB) framework to the context of academic integrity and PDS use in a Pakistani university setting, filling a gap identified by prior South Asian scholarship. Practically, the findings will assist university administrators and faculty in designing more effective integrity programs. At the policy level, results can inform HEC guidelines regarding mandatory PDS adoption and accompanying pedagogical support.

2. Review of Literature

2.1 Conceptual Background

Plagiarism, derived from the Latin *plagium* meaning 'to kidnap', refers broadly to the presentation of another's intellectual work as one's own. In academic writing, it encompasses direct copying, paraphrasing without attribution, self-plagiarism, and the submission of purchased essays. Digital technology has transformed both the frequency and forms of plagiarism: students can access vast online repositories within seconds, and AI-assisted rewriting tools can transform copied text in ways that challenge traditional detection methods. Plagiarism detection software addresses this challenge through algorithmic comparison. Modern tools such as Turnitin use multi-layered database matching, comparing submissions against internet content, published academic literature, and a proprietary repository of previously submitted student work. Advanced natural language processing modules allow these tools to detect not only verbatim copying but also sophisticated paraphrasing, producing a similarity report with

a percentage score and highlighted matching passages. This study adopts the Knowledge–Attitude–Behaviour (KAB) framework as its theoretical lens. The KAB model posits that knowledge of a concept shapes an individual's attitudes toward it, which in turn influences behaviour. Applied to the current context, awareness of plagiarism detection software (knowledge) is expected to cultivate a sense of accountability and understanding of academic integrity norms (attitude), which then manifests in more conscientious academic writing and citation practices (behaviour). This framework is consistent with prior studies in information security education and has been validated in related academic integrity research.

2.2 Review of the Empirical Studies

A substantial body of empirical research has examined the relationship between plagiarism detection software and academic behaviour. The growing integration of artificial intelligence (AI) into higher education has significantly transformed approaches to academic integrity, particularly through the adoption of plagiarism detection systems (PDS). Existing literature consistently demonstrates that AI-powered plagiarism detection tools contribute to reducing academic misconduct while simultaneously supporting students' academic writing development. Across different educational contexts, researchers have examined the effectiveness, pedagogical value, ethical implications, and limitations of these technologies. A substantial body of research highlights the effectiveness of AI-driven plagiarism detection systems in identifying unoriginal content and discouraging dishonest academic practices. Khalid et al. (2021) found that AI-based plagiarism detection tools improved originality in student submissions and contributed to a noticeable reduction in academic dishonesty. Similarly, Ahmed and Patel (2019) argued that plagiarism detection systems function not only as monitoring mechanisms but also as educational tools that deter misconduct through increased accountability. Supporting these findings, Brinkman (2018) reported that the implementation of plagiarism detection software positively influenced students' adherence to academic integrity standards,

although concerns regarding privacy and data security remained unresolved.

Several studies have emphasized the pedagogical benefits of plagiarism detection systems beyond their policing function. Martin et al. (2021) observed that similarity reports generated by plagiarism detection software helped students improve citation practices and source attribution skills. Likewise, Ali and Hussain (2019) found that frequent use of plagiarism detection systems in higher education institutions was associated with improved academic writing quality and greater awareness of proper referencing techniques. These findings suggest that plagiarism detection technologies can serve formative educational purposes by helping students recognize and correct writing deficiencies before final submission.

Research also indicates that students' understanding of academic integrity principles plays a crucial role in determining the effectiveness of plagiarism detection technologies. Nguyen and Lim (2019) reported that students with greater awareness of plagiarism and academic ethics were more likely to demonstrate responsible academic behaviour. Similarly, Shahid and Akram (2020) identified inadequate awareness of plagiarism policies and insufficient academic writing skills as major causes of academic dishonesty among university students in Pakistan. These studies collectively suggest that technological interventions alone may not be sufficient unless accompanied by educational initiatives that enhance students' ethical understanding and academic literacy.

The literature further explores the broader role of AI in promoting academic integrity. Kumar and Gupta (2020) argued that while AI-based plagiarism detection systems offer considerable benefits, their effectiveness is maximized when integrated with ethics education and institutional integrity policies. More recently, Mishra (2023) highlighted the emerging capabilities of AI technologies in providing real-time feedback, advanced text analysis, and automated support for maintaining academic standards. These developments indicate a shift from traditional detection-focused approaches toward more comprehensive systems that

support learning and academic skill development.

Despite the generally positive findings, several studies identify important challenges and limitations associated with plagiarism detection technologies. Foltynnek et al. (2019), in their comprehensive review of plagiarism detection systems, noted that although such tools offer extensive coverage and sophisticated detection mechanisms, they remain susceptible to false positives and cannot always accurately distinguish between intentional plagiarism and legitimate textual similarity. Similarly, Dixit and Chand (2024) argued that issues related to implementation costs, technological scope, and contextual limitations continue to restrict the effectiveness of AI-powered plagiarism detection systems, particularly in resource-constrained educational environments.

Student perceptions also emerge as a significant factor influencing the successful adoption of plagiarism detection technologies. Iqbal and Awan (2022) found that some students perceive plagiarism detection systems as unfair or punitive, leading to reduced acceptance and compliance. This finding contrasts with studies emphasizing the educational value of plagiarism detection tools (Ahmed & Patel, 2019; Martin et al., 2021), suggesting that institutional approaches and communication strategies may shape how students interpret and engage with these technologies.

Overall, the reviewed literature demonstrates broad agreement regarding the positive contribution of AI-powered plagiarism detection systems to academic integrity. Most studies report improvements in originality, citation practices, and ethical awareness among students (Khalid et al., 2021; Martin et al., 2021; Ali & Hussain, 2019). However, scholars also caution that technology alone cannot eliminate academic dishonesty. Factors such as student awareness, ethical education, perceptions of fairness, privacy concerns, false-positive detections, and institutional support significantly influence the effectiveness of plagiarism detection systems (Nguyen & Lim, 2019; Shahid & Akram, 2020; Foltynnek et al., 2019; Iqbal & Awan, 2022; Dixit & Chand, 2024). Consequently, contemporary research increasingly advocates a balanced approach in which AI-based detection technologies are

integrated with educational interventions, ethical training, and supportive academic policies to foster a sustainable culture of academic integrity. Table 1 summarizes twelve key studies organised by author, year, geographical context, research focus, and primary finding. Collectively, these studies establish that awareness of PDS is a necessary but insufficient condition for academic integrity. Students who understand how

detection tools operate are more likely to cite properly and avoid deliberate plagiarism; however, awareness alone does not guarantee behavioural change without institutional support, ethics education, and a positive perception of the fairness of detection processes. The current study builds on these foundations by providing localised empirical data from Pakistani undergraduate students.

Table 1. Review of the empirical studies

Author(s)	Year	Context	Focus	Key Finding
Khalid et al.	2021	South Asia	AI plagiarism detection effectiveness	Improved originality and reduced dishonesty
Martin et al.	2021	UK/Global	PDS & student learning	Similarity reports improve citation habits
Ali & Hussain	2019	Pakistan	PDS in HE: trends & practices	Frequent use correlates with better writing
Nguyen & Lim	2019	Asia	Student awareness & integrity	Awareness shapes ethical behaviour
Ahmed & Patel	2019	International	Role of PDS in integrity	Deters misconduct; acts as learning tool
Kumar & Gupta	2020	India	AI in HE: applications & ethics	AI-PDS must combine with ethics education
Shahid&Akram	2020	Pakistan	Academic dishonesty: causes & solutions	Unawareness & writing skills gap are main causes
Iqbal & Awan	2022	Pakistan	Student perceptions of PDS	Negative fairness perception limits compliance
Foltynek et al.	2019	Europe	Academic plagiarism detection review	Comprehensive coverage still has false-positive risk
Brinkman	2018	USA	Impact of PDS on integrity	PDS positive but privacy concerns persist
Mishra	2023	India	AI in upholding integrity	AI enhances detection & real-time feedback
Dixit & Chand	2024	India	Plagiarism detection issues & challenges	Cost & scope still limit AI-PDS effectiveness

3. Research Methodology

3.1 Research Design

This study employed a quantitative, cross-sectional survey design. The quantitative approach was selected because the research objectives require systematic measurement of constructs i.e. awareness, behavior, and perceived effectiveness across a defined sample at a single point in time. Three primary variables were examined: PDS awareness (independent variable), academic integrity behavior (dependent variable), and perceived effectiveness of PDS (mediating variable).

Demographic factors including gender, year of study, field, and prior training were treated as control variables.

3.2 Population and Sampling

The target population comprised undergraduate students enrolled at Pakistani universities, with a focus on students from computing and related disciplines, given their comparatively high engagement with digital submission platforms and plagiarism detection tools. A convenience sampling method was used: an online questionnaire was distributed

through university WhatsApp groups, peer networks, and academic contacts over a ten-day data collection period. Only currently enrolled undergraduate students who had submitted at least one academic assignment were eligible to participate. Incomplete responses were removed before analysis. A total of 100 usable responses were retained.

3.3 Data Collection Instrument

A structured online questionnaire was developed based on validated instruments in the existing literature, including scales from Khalid et al. (2021), Iqbal and Awan (2022), and Martin et al. (2021). The instrument was divided into four sections: Section A collected demographic information; Section B measured PDS awareness through five Likert-scale items; Section C assessed academic integrity behaviour through five items; and Section D captured perceived effectiveness of PDS through five items. All items used a five-point response scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). A pilot test conducted with 15 students confirmed clarity and reliability, yielding a Cronbach's alpha of 0.81, indicating good internal consistency.

3.4 Data Analysis

Data were analysed using descriptive statistics computed in Microsoft Excel and SPSS. Frequencies, percentages, mean scores, and standard deviations were calculated for all demographic variables and Likert-scale items. Composite mean scores for each construct were derived by averaging item-level scores. Mean scores were interpreted as follows: 1.00–2.49 = Low; 2.50–3.49 = Moderate; 3.50–4.49 = High; 4.50–5.00 = Very High.

3.5 Ethical Considerations

All participants were informed of the academic purpose of the study prior to completing the

survey. Participation was entirely voluntary, and respondents were assured that their responses would remain confidential and anonymous. Informed consent was confirmed electronically before proceeding. No personally identifying information was collected.

3.6 Limitations

Several limitations should be noted. First, the sample of 100 respondents obtained through convenience sampling may not fully represent the diversity of Pakistani university students. Second, self-reported data are subject to social desirability bias. Third, the cross-sectional design cannot assess whether attitudes or behaviours change over time following PDS exposure. Future studies should employ larger randomly selected samples and longitudinal or experimental designs.

4. Data Analysis and Results

This section presents a comprehensive analysis of the data collected from 100 student respondents. Each sub-section includes detailed tables and narrative interpretations of the key construct examined in the study.

4.1 Demographic Profile of Respondents

Table 2 presents the demographic characteristics of the sample. The majority of respondents identified as male (55.0%), consistent with the gender distribution commonly observed in computing programs at Pakistani universities. Students from the second and third years of study were most represented (31.0% and 28.0% respectively). A large majority (74.0%) was enrolled in Computer Science or IT programs. Nearly half (48.0%) reported using plagiarism detection tools regularly, while 17.0% had never used them. Notably, 61.0% reported having received some form of academic integrity training.

Table 2. Demographic information

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	55	55.0%
	Female	33	33.0%
	Prefer Not to Say	12	12.0%
Year of Study	1st Year	22	22.0%

Characteristic	Category	Frequency (n)	Percentage (%)
	2nd Year	31	31.0%
	3rd Year	28	28.0%
	4th Year / Final	19	19.0%
Program	Computer Science / IT	74	74.0%
	Other Fields	26	26.0%
Turnitin Exposure	Used Regularly	48	48.0%
	Used Occasionally	35	35.0%
	Never Used	17	17.0%
Integrity Training	Yes	61	61.0%
	No	39	39.0%

4.2 Awareness of Plagiarism Detection Software

Table 3 presents item-level descriptive statistics for the PDS awareness construct. The composite awareness mean of 3.90 places the sample firmly in the High category. Item A5 awareness of consequences of submitting plagiarized work received the highest mean (4.28), suggesting that institutional messaging around penalties has been effective. In contrast,

Item A3, which assessed understanding of how PDS checks originality, received the lowest score within the high range (3.67), indicating that while students know PDS exists, their understanding of its technical mechanisms is shallower. This pattern of strong awareness of consequences and tool existence, weaker understanding of underlying processes is consistent with findings reported by Iqbal & Awan (2022).

Table 3: PDS Awareness Item-Level Descriptive Statistics (N = 100)

Item	Statement	Mean	Level
A1	I know what plagiarism detection software (PDS) is	4.12	High
A2	I am aware that Turnitin is used at my institution	3.94	High
A3	I understand how PDS checks originality of submitted work	3.67	High
A4	I know that PDS compares work against published databases	3.51	High
A5	I am aware of the consequences of submitting plagiarized work	4.28	High
	Composite Awareness Mean	3.90	High

4.3 Academic Integrity Behaviour

Table 4 presents item-level statistics for academic integrity behaviour. The composite mean of 3.50 indicates that students generally report positive integrity practices, though with meaningful room for improvement. Items C1 (citing sources, $M = 3.82$) and C4 (feeling more responsible because of PDS, $M = 3.73$) scored highest. Item C3 (using PDS feedback to

improve referencing, $M = 3.44$) fell in the Moderate range, indicating that students do not consistently use similarity reports as a learning resource. Most notably, Item C5 reporting suspected plagiarism to faculty achieved the lowest score ($M = 2.89$, Moderate), reflecting a reluctance to act as peer monitors of integrity, consistent with Shahid & Akram (2020).

Table 4: Academic Integrity Behaviour Item-Level Descriptive Statistics (N = 100)

Item	Statement	Mean	Level
C1	I always cite sources when I use others' ideas in my work	3.82	High
C2	I revise my writing to ensure it is original before submission	3.61	High
C3	I use PDS feedback to improve my referencing skills	3.44	Moderate
C4	I feel more responsible about originality because of PDS	3.73	High
C5	I report suspected plagiarism cases to faculty or authorities	2.89	Moderate
	Composite Integrity Mean	3.50	High

4.4 Perceived Effectiveness of PDS

Table 5 presents item-level statistics for students' perceptions of PDS effectiveness. The composite mean of 3.50 indicates a High overall perception. Students rated Item E2 – that PDS encourages original writing – most highly (M = 3.78), confirming a perceived deterrent effect consistent with the literature.

However, Items E3 (PDS reports help me understand where I went wrong, M = 3.40) and E4 (PDS is fair in identifying similarity, M = 3.12) fell in the Moderate range, pointing to concerns about the educational utility and perceived fairness of the technology, echoing Iqbal and Awan (2022) and Foltynnek et al. (2019).

Table 5: Perceived Effectiveness of PDS Item-Level Descriptive Statistics (N = 100)

Item	Statement	Mean	Level
E1	PDS has reduced plagiarism cases at my institution	3.55	High
E2	PDS encourages students to write original work	3.78	High
E3	PDS reports help me understand where I went wrong	3.40	Moderate
E4	PDS is fair in identifying similarity	3.12	Moderate
E5	PDS is an effective tool for academic integrity	3.67	High
	Composite Effectiveness Mean	3.50	High

4.5 Construct-Level Composite Mean Comparison

Table 6 summarizes the composite means across all three constructs. PDS awareness is highest (3.90), followed by academic integrity behaviour and perceived effectiveness, both at 3.50. This gradient suggests that knowledge about PDS has outpaced behavioural change –

students know about the tools and recognize their deterrent function, but have not yet fully translated this awareness into consistent integrity-promoting behaviours. These findings support both H1 and H2, and align with the broader empirical consensus that PDS must be embedded within a supportive institutional ecosystem to reach its full potential.

Table 6: Construct-Level Composite Mean Comparison (N = 100)

Construct	Mean	Std. Dev.	Level
PDS Awareness (A1–A5)	3.90	0.47	High
Academic Integrity Behaviour (C1–C5)	3.50	0.52	High
Perceived Effectiveness (E1–E5)	3.50	0.55	High

4.6 Scenario-Based Analysis

Analysis of scenario-based responses revealed that while most students are aware of plagiarism rules, their ability to correctly apply these rules in complex situations varies. A majority of respondents correctly identified direct plagiarism and improper citation practices. However, confusion was observed in scenarios involving paraphrasing and acceptable similarity thresholds, where several students were uncertain whether content would be flagged by tools such as Turnitin. Students also showed moderate ability in interpreting similarity reports: while they understood that high similarity percentages indicate potential issues, many could not distinguish between acceptable matches (e.g., references, common phrases) and problematic overlaps. Overall, although awareness of PDS is high, students require deeper practical training to effectively interpret reports and apply academic integrity principles.

4.7 Training, Exposure to PDS, and Need for Academic Integrity Programs

The findings indicate that 61% of respondents received academic integrity training, while 48% reported regular use of PDS tools. Students who received prior training demonstrated relatively higher awareness and better academic integrity behaviour, supporting the assumption that training plays a crucial role in shaping ethical academic practices. Despite this exposure, many respondents expressed uncertainty regarding proper use of similarity reports, acceptable similarity percentages, and the fairness of detection systems. A strong majority of students indicated that universities should provide hands-on PDS training, allow access to similarity reports before final submission, and conduct workshops on citation, paraphrasing, and referencing.

5. Implications of the Study

This study demonstrates that plagiarism detection software can meaningfully support the development of academic integrity among Pakistani university students, but only when embedded within a broader institutional culture that combines technology deployment with ethics education, faculty guidance, and transparent communication about how PDS

works and why it matters. Universities should integrate PDS not merely as a policing mechanism but as a pedagogical tool, sharing similarity reports with students and using them as the basis for writing workshops and citation tutorials. The HEC is encouraged to standardize PDS adoption requirements across both public and private institutions to address the current equity gap in access. Future researchers should pursue experimental and longitudinal designs to measure whether targeted PDS-integrated integrity interventions produce lasting behavioural change.

6. Conclusion

This study examined the awareness, behavioural impact, and perceived effectiveness of plagiarism detection software among 100 undergraduate students at Pakistani universities. Students are generally well-informed about the existence and purpose of PDS tools, and this level of awareness is associated with relatively higher self-reported academic integrity behaviour. Students also perceive plagiarism detection software as an effective mechanism for promoting originality and discouraging academic dishonesty, acknowledging both its deterrent and motivational role. However, the study also highlights several important gaps. Students do not consistently utilise PDS feedback as a learning resource to improve referencing and writing skills. There is a noticeable reluctance to report instances of peer plagiarism, which may reflect social or cultural constraints. Furthermore, moderate concerns were identified regarding the perceived fairness and accuracy of plagiarism detection algorithms. Technological tools alone are insufficient to ensure academic integrity; effective implementation of PDS must be supported by comprehensive academic training, clear institutional policies, and a strong culture of ethical scholarship.

7. Recommendations

Based on the findings of this study, it is recommended that higher education institutions adopt plagiarism detection software in a more systematic and standardized manner across both public and private sector universities. PDS should be integrated as a

formative learning resource enabling students to review similarity reports before final submission. Universities should strengthen academic integrity through structured training programs and curriculum-based instruction on plagiarism, citation practices, and ethical research writing. Faculty members should be trained to interpret similarity reports accurately and guide students constructively. The HEC

should develop standardized national guidelines for PDS implementation and monitoring. Universities should also promote academic honesty by establishing confidential mechanisms for reporting misconduct without fear of retaliation, and improve students' research and critical thinking skills through dedicated support services such as writing centers and referencing clinics.



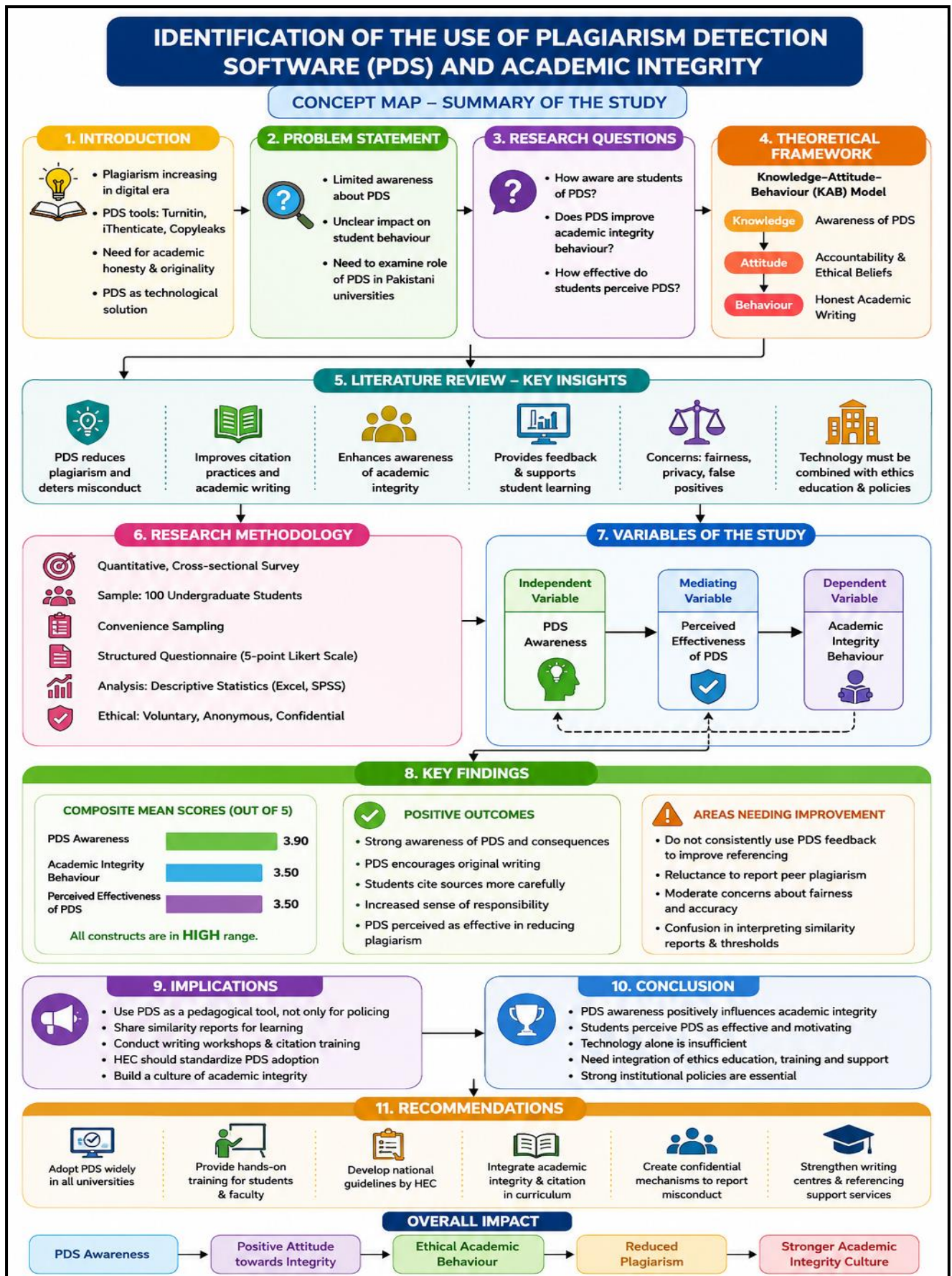


Figure 2. Meta synthesis of the study

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