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Truth Verification Using Polygraph Examination Technique: Basis for Polygraph Examination Reliability and Validation Design

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ABSTRACT

This study investigates the relationships among student demographic characteristics, physiological responses associated with truth verification, post-test interview outcomes, profile significance, and overall polygraph examination results among student transgressors. Utilizing a computerized polygraph system (CPSpro) and the Empirical Scoring System (ESS), 200 Criminology students were subjected to the Directed Lie Screening Test (DLST). Results revealed a very strong and significant relationship between the physiological responses and the overall polygraph examination results ($r = .846$, $p < .001$). However, the relationship between physiological responses and overall post-interview outcomes was weak and not statistically significant ($r = .125$, $p > .05$). Based on these findings, an evidence-based Polygraph Examination Reliability and Validation Design was formulated to enhance the consistency, objectivity, and accuracy of interpretation of physiological measures in disciplinary proceedings.

Keywords: Truth Verification; Polygraph Examination; Empirical Scoring System; Directed Lie Screening Test; Educational Settings; Criminology Discipline.

1.0. Introduction

Maintaining discipline and accountability within educational institutions requires fair, systematic, and evidence-based approaches to addressing student misconduct (U.S. Department of Education, 2023). Despite the presence of institutional policies, violations persist, creating challenges for administrators in determining responsibility and truthfulness among student transgressors (Ben-Attia et al., 2019). As a result, there is a growing need for objective tools that can support truth verification processes in disciplinary settings. This study investigates the relationships among student demographic characteristics, physiological responses associated with truth verification, post-test interview outcomes, profile significance, and overall polygraph examination results among student transgressors who undergo the Polygraph Examination Screening Test.

Deception detection is a sensitive component of criminology and institutional regulation in the Philippines, where polygraph examinations are often utilized in investigative, screening, and evaluative contexts. Although polygraph results are subject to legal and ethical limitations, they remain valuable as decision-support tools when used alongside structured interviews and standardized scoring systems. Their application within educational institutions, however, remains limited and insufficiently examined, particularly with respect to how student-specific factors influence examination outcomes (Ben-Attia et al., 2019). This gap necessitates systematic investigation into the applicability of polygraph testing among student populations.

The Empirical Scoring System (ESS) provides a standardized, numerical framework for interpreting physiological data obtained during polygraph examinations (Backster, 2000). By applying objective scoring criteria to physiological indicators such as cardiovascular activity, respiratory patterns, and electrodermal responses, ESS reduces examiner subjectivity and enhances consistency across test results. Its integration within the Polygraph

Examination Screening Test supports the accurate assessment of physiological responses associated with truth verification, directly addressing the need to quantify respondents' levels of physiological reactions during testing.

Physiological responses measured through polygraph sensors serve as objective indicators of autonomic nervous system activation associated with deception and truthfulness (National Research Council, 2003). These responses reflect cognitive load, emotional arousal, and stress regulation processes that occur during questioning. However, the interpretation of such responses must account for individual differences among respondents. Demographic characteristics including age, health condition, sex, religion, school policy violated, and study status may influence baseline physiological functioning, stress reactivity, and emotional responses during the examination. These characteristics therefore warrant systematic examination, both as descriptive variables and as potential moderating factors affecting physiological responses and polygraph outcomes.

Post-test interviews represent a critical qualitative component of the polygraph examination process. Through these interviews, respondents' verbal explanations, admissions, denials, and behavioral cues are assessed and categorized as admissive or non-admissive outcomes. Post-test interviews provide contextual clarification of physiological findings and help distinguish deception-related responses from reactions caused by anxiety, health concerns, or situational stress. Examining the relationship between physiological responses and post-interview outcomes allows for a more comprehensive understanding of truth verification beyond sensor data alone (American Polygraph Association, 2020).

The outcomes of the polygraph examination classified through ESS-based scoring and expert evaluation serve as the primary indicators of truth verification results. Understanding how these outcomes relate to respondents' physiological responses and demographic characteristics is essential in evaluating the effectiveness and fairness of the Polygraph Examination Screening Test in an educational setting (National Research Council, 2003). Moreover, assessing whether respondents' characteristics significantly moderate the relationships between physiological responses and polygraph results, as well as between physiological responses and post-interview outcomes, provides insight into the conditional effects of individual differences on examination accuracy.

In addition to statistical analysis, expert panel observations play a vital role in validating polygraph examination outcomes. The professional judgments of trained polygraph examiners offer interpretive insights into response patterns, testing conditions, and profile significance that may not be fully captured through quantitative measures alone. Documenting these expert observations contributes to the methodological rigor of the study and supports the triangulation of findings (American Polygraph Association, 2020).

Ultimately, this research contributes to the advancement of evidence-based disciplinary practices by evaluating the scientific reliability and contextual applicability of polygraph examinations among students. The findings are expected to inform institutional policy development, examiner training, and ethical safeguards, ensuring that truth verification methods support fairness, accuracy, and accountability while respecting students' rights and individual differences.

1.1. Study Objectives

1. To determine the relationships among examinees' socio-demographic profiles, physiological responses, polygraph examination results, and post-test interview outcomes to formulate an evidence-based Polygraph Examination Reliability and Validation Design tailored for educational disciplinary settings.
2. To profile student transgressors based on their socio-demographic characteristics, namely age, sex, health background, and the specific school policy violated prior to the examination.
3. To evaluate the physiological responses of the examinees, focusing specifically on respiratory (pneumograph), electrodermal activity (EDA), and cardiovascular changes during the administration of the Directed Lie Screening Test (DLST 1 and DLST 2).
4. To determine the outcomes of the truth verification process by assessing the polygraph results using the Empirical Scoring System (ESS) alongside the classification of post-test interview results as admissive, non-admissive, or neutral.
5. To test the significant relationships among the measured physiological responses, final polygraph examination results, and post-test interview outcomes in order to develop and propose a robust Polygraph Examination Reliability and Validation Design based on the synthesized quantitative and qualitative findings.

2.0. Literature Review

Polygraph screening relies entirely on structural standardization and objective analysis to remain credible. This is where the Directed Lie Screening Test (DLST) becomes essential; it allows examiners to screen for multiple target behaviors simultaneously without running into the procedural bottlenecks common in traditional, single-issue diagnostic tests (Handler et al., 2008). By using directed-lie comparison questions, the DLST builds a reliable baseline that yields predictable, measurable responses from truthful examinees under a uniform question sequence (Nelson and Handler, 2012). To cut out examiner bias during chart analysis, the Empirical Scoring System (ESS) introduces a strict numerical framework centered purely on major autonomic changes in respiration, heart rate, and electrodermal activity (Backster, 2000). When paired together, the DLST and ESS regularly achieve an accuracy rate between 85% and 90% while keeping inconclusive results to an absolute minimum compared to old-school manual scoring methods (Nelson, 2015).

Underneath these polygraph charts are complex cognitive and survival responses. Fabricating or holding back information forces the brain to work much harder than simply telling the truth, triggering sharp shifts in sweat gland activity, breathing patterns, and heart rates (National Research Council, 2003; Stern et al., 2010). But these physiological baselines are never one-size-fits-all; an individual's background, age, and emotional maturity can completely warp how they react to stress during an exam (Johnston et al., 2010; Steinberg, 2005). This variability highlights a massive disconnect in forensic practice: data shows that a person's raw physiological charts rarely correlate with what they actually confess during a post-test interview (Cleary and Bull, 2021). While polygraph sensors track immediate, involuntary nervous system spikes, a post-test confession is a conscious, socially driven narrative choice (Krapohl et al., 2023). Because of this, reliable truth verification designs must treat physical sensor data and interview outcomes as two completely separate diagnostic elements.

3.0. Research Methodology

3.1. Research Design

This study utilized a descriptive-correlational research design within a quantitative, non-experimental framework, while employing a cross-sectional approach for its time dimension. According to Babbie (2016), a cross-sectional design involves observing a sample of a population or phenomenon at one specific point in time. This was highly appropriate for this study, as data regarding the socio-demographic profiles, physiological responses, and polygraph outcomes of the student transgressors were collected during a single testing period within the Academic Year 2024-2025. The descriptive objective of this design was utilized to systematically profile the respondents' socio-demographic characteristics and accurately quantify their physiological baseline and reactions specifically respiratory, electrodermal, and cardiovascular changes. Furthermore, the correlational objective was crucial for rigorously testing the hypotheses. As defined by Fraenkel, Wallen, and Hyun (2012), correlational research determines the presence, direction, and strength of relationships between two or more quantitative variables without manipulating the subjects. This justified its use in the current study, as the researchers sought to measure the natural relationships among the physiological responses, the polygraph examination results under the Empirical Scoring System (ESS), and the post-test interview outcomes without artificially intervening in the testing environment.

Contextually, employing a non-experimental, quantitative design is standard practice when evaluating psychophysiological screening tools in institutional or educational disciplinary settings (Creswell, 2014). Because the polygraph examinations were conducted as part of actual administrative disciplinary proceedings for school policy violations, it was both ethically and practically necessary to observe the subjects in their natural state of examination rather than assigning them to controlled experimental groups. Ultimately, by establishing the statistical relationships between the biological data and the truth verification outcomes, this design provided the precise empirical foundation required to formulate and propose the study's primary output: the Polygraph Examination Reliability and Validation Design tailored for educational institutions.

3.2. Research Setting

The research was conducted at PHINMA Cagayan de Oro College Cagayan de Oro City, specifically within the Forensic Laboratory, which was equipped with facilities for computerized polygraph testing and screening. The polygraph examination room was meticulously designed to eliminate all external stimuli, ensuring that the subjects' physiological responses were triggered solely by the test questions rather than environmental distractions. To achieve this, the room was heavily soundproofed and located in a quiet, low-traffic area of the building. The interior featured a sterile, minimalist aesthetic with neutral colors, absolutely no decorations, and no windows, preventing any visual diversions that could compromise the test. Furnishings were kept sparse, primarily featuring a specialized chair with wide armrests to comfortably secure the physiological sensors and limit subject movement, alongside an examiner's desk positioned slightly out of the subject's direct line of sight. Crucially, the environment was strictly temperature-controlled to prevent natural sweating or shivering and was equipped with unobtrusive audio-video recording technology accompanied by an adjoining observation room with a one-way mirror to meet

the rigorous ethical and operational standards outlined by the American Polygraph Association standard of practice.

3.3. Population and Sample

The population of this study consisted of Criminology students enrolled at PHINMA Cagayan de Oro College Cagayan de Oro City. From this population, a sample size of 200 third year and fourth-year students was selected to serve as the respondents of the research. The researcher utilized a purposive sampling technique, as the participants were specifically chosen based on a distinct set of criteria: they were student transgressors who were subjected to the computerized polygraph test due to alleged violations of institutional policies during administrative disciplinary proceedings. The selection of these specific year levels ensured that the respondents had a sufficient level of maturity and baseline understanding of criminological concepts, which aided in their comprehension of the truth verification process. Prior to the administration of the tests and data collection, informed consent was strictly secured from all 200 respondents, ensuring that their participation in the study was entirely voluntary and ethically conducted.

3.4. Research Instrument

The research instrument was anchored to the Directed Lie Screening Test (DLST), an evidence-based psychophysiological detection of deception (PDD) protocol originally adapted from the federal Test for Espionage and Sabotage (TES) developed by the U.S. Department of Defense and expanded for field applications by Handler, Nelson, and Blalock (2008). The structural design of this screening instrument focused tightly on the optimization of sacrifice-relevant questions, the validation of standardized comparison questions, and the complete elimination of subjective examiner field variations.

The DLST was composed of scored and non-scored stimuli, encompassing four distinct question types: relevant, comparison, irrelevant (neutral), and sacrifice-relevant questions. As a standardized format designed to yield an objective diagnostic profile, the core mechanism of the DLST required the examiner to instruct the respondent to lie directly to broad, non-threatening Directed Lie Comparison (DLC) queries (e.g., "Before the age of 21, did you ever tell a lie?"). The physiological response elicited by this known, directed lie established a personalized baseline of deception for the individual. This baseline was mathematically compared against the respondent’s physiological reactions to the Relevant Questions, which pertained directly to the school policy violation under investigation. A significantly stronger physiological reaction to a relevant question than to the directed lie comparison questions indicated deception, while a weaker reaction indicated truthfulness.

To process this data, the Empirical Scoring System (ESS) was utilized as the manual data analysis framework. The ESS provided an evidence-based, rule-bound methodology for analyzing raw polygraph charts across three physiological components: respiration, electrodermal activity, and cardiovascular arousal. By replacing subjective examiner interpretations with a rigid three-position scale (-1, 0, +1) and mathematically derived normative cutscores (Nelson, Krapohl, and Handler, 2011), the ESS served as the ideal companion to the DLST format. Because the DLST minimizes psychological manipulation and maximizes testing standardization, evaluating its

data through the purely objective criteria of the ESS created a highly transparent, transparent, and legally defensible protocol. Furthermore, validation studies confirmed that pairing the DLST with the ESS drastically minimized inconclusive rates and achieved high criterion validity (Nelson, Handler, and Blalock, 2012), effectively differentiating between truthful and deceptive individuals at rates significantly exceeding chance.

3.5. Ethical Considerations

This study adhered strictly to ethical standards in the conduct of research involving human participants. Confidentiality of the respondents was maintained by assigning numerical codes in place of names and other identifying information. Anonymity was ensured by excluding personal identifiers from all data collection instruments, records, and reports. All computerized polygraph data and related documents were stored in protected digital files accessible only to the researcher. Hard copies of documents, if any, were kept in a secured location. The collected data were used solely for academic and research purposes and were not disclosed to unauthorized individuals. Participants were informed of their rights, including voluntary participation and withdrawal, prior to data collection. These measures were implemented to protect the privacy, dignity, and welfare of all respondents throughout the research process.

4.0. Results and Discussion

4.1. Level of Physiological Response (SOP 1)

Looking at the specific items, the highest mean score was recorded for the question regarding missing class due to drunkenness (x = 2.26), yet it remained within the "No Significant Response" range. While this item prompted a slightly higher reaction than others, the lack of a "Significant Response" implies that even this topic did not generate enough psychological pressure to be construed as deception. Conversely, the lowest mean score was observed for the item concerning skipping class without permission (x = 2.13), which represents the most stable physiological state among the participants. This minimal reactivity supports the theory proposed by Convertino, Talbot, and Mazzoni (2024), which suggests that individuals who are not experiencing the psychological stress of concealment will exhibit little to no physiological deviation during relevant questioning. Collectively, these results indicate that the participants' autonomic nervous systems encompassing respiration, electrodermal activity, and cardiovascular responses stayed within normal parameters throughout the examination.

Table 1. Respondents' Level of Physiological Response

Question Tracked	Mean Score	Standard Deviation (SD)	Statistical Interpretation	Description Level
Q1. Have you ever cheated on a major examination?	2.15	0.38	No Significant Response	Normal Level
Q2. Have you ever skipped class without permission?	2.13	0.37	No Significant Response	Normal Level

Q3. Have you ever placed a bet on any form of gambling?	2.15	0.42	No Significant Response	Normal Level
Q4. Have you ever missed class activity due to drunkenness?	2.26	0.50	No Significant Response	Normal Level
Overall Composite Score	2.17	0.42	No Significant Response	Normal Level

4.2. Polygraph Examination Results (SOP 2)

The data gathered from the polygraph examinations reveals an overall composite mean of 2.43, which falls within the "Truthful" and is characterized as an "Average Response". This general result suggests that the majority of respondents did not exhibit the physiological markers typically associated with deception when undergoing the test. From a researcher's perspective, this indicates a high level of transparency among the student population regarding these behavioral inquiries, suggesting that their physiological responses remained stable and within acceptable limits. These findings align with the observations of Rad et al. (2024), who note that polygraph results are categorized as truthful when the recorded data specifically respiration, electrodermal, and cardiovascular activities do not show extreme variations. Similarly, Kuptsova and Dvoryanchikov (2023) emphasize that the absence of significant physiological spikes during relevant questions is the primary indicator of a truthful classification.

When analyzing specific behaviors, the question regarding cheating on major examinations yielded the highest mean of 2.68, interpreted as Truthful. This suggests that respondents were remarkably honest or perhaps felt less physiological pressure when admitting to or denying academic dishonesty, possibly because the physiological arousal associated with this topic was not strong enough to trigger a deceptive rating. Conversely, the lowest mean was recorded for the question concerning missing class activities due to drunkenness, which scored 2.12 and fell into the "Deceitful" with a "Reactive Response". This specific drop indicates that this topic triggered significant physiological reactions in several respondents, suggesting that the intersection of substance use and academic responsibility may carry a higher psychological or social weight. This outcome supports the Empirical Scoring System's premise that significant physiological responses to relevant questions are indicative of deception, highlighting how certain sensitive topics can provoke more intense internal reactions than others.

Table 2. Respondents' Polygraph Examination Results

Question Tracked	Mean Score	Standard Deviation (SD)	Statistical Interpretation	Description Level
Q1. Have you ever cheated on a major examination?	2.68	0.70	Truthful	Average Response

Q2. Have you ever skipped class without permission?	2.34	0.90	Truthful	Average Response
Q3. Have you ever placed a bet on any form of gambling?	2.61	0.80	Truthful	Average Response
Q4. Have you ever missed class activity due to drunkenness?	2.12	1.00	Deceitful	Reactive Response
Overall Composite Result	**2.43**	**0.90**	**Truthful**	**Average Response**

4.3. Inter-relationship Between Physiological Responses and Polygraph Results (SOP 3)

The correlation matrix presented in Table 3 reveals a significant and robust relationship between the subjects' physiological responses and the polygraph examination results. The overall data indicates a very strong positive correlation ($r = .846$, $p < .001$), leading to the rejection of the null hypothesis. This suggests that as physiological indicators intensify, the polygraph diagnostic outcomes become increasingly definitive. This alignment mirrors the Empirical Scoring System's reliance on quantifiable data such as respiratory and cardiovascular activity to assess deception. From a researcher's perspective, these findings underscore the objective nature of modern polygraphy, demonstrating that the scoring system effectively translates raw biological signals into a reliable diagnostic conclusion. This is consistent with Kim et al. (2025), who noted that quantifiable physiological responses are the bedrock of assessing the probability of deception.

Focusing on specific metrics, the highest correlation was observed between PR1 and Poly1 ($r = .802$, $p < .001$), signifying a nearly seamless link between specific physiological triggers and their corresponding polygraph measures. Conversely, the lowest significant correlation among the primary indicators was found between PR2 and Poly2 ($r = .741$, $p < .001$), yet even this value represents a strong positive association. When considering cross-variable relationships, PR2 also showed a moderate correlation with the overall results ($r = .511$, $p < .001$).

These results confirm that while certain physiological markers may be more sensitive than others, all measured responses contribute meaningfully to the final interpretation. The consistency across these variables validates the findings of Wu et al. (2022), who established that the Empirical Scoring System maintains its validity through the significant correlation between physiological measures and diagnostic results. This high level of statistical significance across all indicators suggests that the polygraph remains a highly integrated tool where individual physiological inputs are reliably synthesized into a global assessment.

From the findings, the null hypothesis that there is no significant relationship between the subject's physiological response and the final polygraph test result is rejected. This indicates that the physiological response is

significantly related to the polygraph test results, suggesting that the physiological responses measured during the polygraph test are strongly linked to the diagnostic conclusions generated by the polygraph technique.

Table 3. Correlation Matrix Between Physiological Responses and Polygraph Exam Results

Variable Correlated Pairs	Computed Coefficient (r)	Analytical Interpretation	Hypothesis Decision
PR1 and Poly1 (Cheating Track)	.802***	Strong positive correlation	Significant
PR2 and Poly2 (Skipping Track)	.741***	Strong positive correlation	Significant
PR3 and Poly3 (Gambling Track)	.787***	Strong positive correlation	Significant
PR4 and Poly4 (Drunkenness Track)	.790***	Strong positive correlation	Significant
Overall Composite Results	**.846*** **	**Very strong positive correlation**	**Reject Null Hypothesis**

4.4. Post-Test Interview Outcomes (SOP 4)

The data in Table 4 reflects an overall mean of 2.43, interpreted as "Admissive." This suggests that after the polygraph examination, a significant majority of the student transgressors chose to provide admissions or clarifications regarding their involvement in the alleged misconduct. From a researcher's perspective, this outcome indicates that the post-interview phase serves as a vital psychological "unloading" period where the presence of forensic evidence encourages honesty. This finding is consistent with the Self-Disclosure Theory, which posits that individuals are more likely to share sensitive or incriminating information when they perceive that their internal secrets have already been externalized through physiological monitoring (Jourard, 1971). By providing an admissive response, students essentially seek to reduce the psychological burden of deception that was quantified during the examination process.

A more granular look at the data shows that the highest mean of 2.68 also falls under the "Admissive" category, specifically reflecting instances where students fully acknowledged the specific details of the incident once confronted with their charts. This insight highlights the efficacy of the "perceived inevitability of detection," where the respondent realizes that further denial is counterproductive because the polygraph has already "spoken" for them. As noted by Vrij et al. (2017), when the cognitive cost of maintaining a lie outweighs the perceived benefits of silence, subjects often shift toward a cooperative stance. Conversely, the lowest mean of 2.12 is interpreted as "Deceitful," representing a smaller group of students who remained non-admissive or deceptive even after the test.

This indicates that while polygraph is a powerful tool for truth-telling, a persistent minority may still employ Techniques of Neutralization, such as denying responsibility or blaming external factors, to protect their self-image despite the evidence (Sykes and Matza, 1957). This suggests that for some transgressors, the fear of institutional consequences remains a stronger motivator than the psychological pressure to be truthful.

Table 4. Respondents' Post-Interview Outcome

Question Tracked	Mean Score	Standard Deviation (SD)	Interpretation
Q1. Have you ever cheated on a major examination?	2.68	0.74	Admissive
Q2. Have you ever skipped class without permission?	2.33	0.94	Admissive
Q3. Have you ever placed a bet on any form of gambling?	2.60	0.80	Admissive
Q4. Have you ever missed class activity due to drunkenness?	2.12	0.98	Deceitful
Overall Composite Behavior	**2.43**	**0.86**	**Admissive**

4.5. Correlation Between Physiological Parameters and Post-Interview Outcomes (SOP 5)

The analysis of the correlation matrix reveals that the overall relationship between physiological responses and post-interview outcomes is weak ($r = .125$) and lacks statistical significance. Consequently, the study fails to reject the null hypothesis, suggesting that an examinee's physiological reactions during a polygraph test do not consistently dictate their behavioral outcomes or admissions during the subsequent interview. This outcome highlights that while bodily reactions provide a snapshot of autonomic activity, they are not definitive predictors of complex human decisions, such as the choice to confess. This aligns with the perspectives of Cleary and Bull (2021), who argue that while physiology may signal stress, the transition from stress to a behavioral response is a nuanced process governed by cognitive and social factors that extend far beyond a mere biological event.

When examining specific indicators, the highest degree of association was found between indicator PR1 and the overall post-interview outcome, yielding a moderate positive correlation ($r = .306$, $p < .001$). This suggests that certain specific physiological markers may hold more diagnostic weight than the aggregate response, potentially reflecting higher levels of emotional arousal or specific psychological triggers in certain respondents. Conversely, the lowest significant relationship was observed between PR4 and PIO1, which showed a negligible to weak negative correlation ($r = -.147$, $p < .05$). These varied findings suggest that the post-interview phase is likely influenced by a mosaic of psychological and situational variables such as the examinee's perception of the evidence

or their inherent willingness to disclose information rather than a direct, linear physiological cause (Krapohl, Handler, and Lynch, 2023).

Based on the results, the null hypothesis that there is no significant relationship between the subject's physiological response and the post-interview result is not rejected. This implies that the physiological response measured during the polygraph test does not have any significant relationship with the overall post-interview result among the respondents in this study.

Table 5. Correlation Between Physiological Responses and Post-Interview Outcomes

Variable Correlated Pairs	Computed Coefficient (r)	Analytical Interpretation	Hypothesis Decision
PR1 and PIO1 (Cheating Track)	−.147*	Negligible relationship	Not Significant
PR2 and PIO2 (Skipping Track)	.168*	Weak positive relationship	Partially Significant
PR3 and PIO3 (Gambling Track)	.165*	Weak positive relationship	Partially Significant
PR4 and PIO4 (Drunkenness Track)	−.187**	Weak negative relationship	Partially Significant
Overall Composite Linkage	**.125**	**Weak overall relationship**	**Fail to Reject Null**

5.0. Conclusion

The findings of this research lead to several key conclusions regarding the use of polygraphy in a school setting. By analyzing physiological data and its relationship to the final results, this study clarifies how respondents react when faced with disciplinary inquiries. The following points summarize the practical and theoretical implications of the data, specifically focusing on the accuracy of the Empirical Scoring System (ESS) and the factors that influence a respondent's truthfulness.

Non-Deceptive Physiological Profiles: The student respondents generally do not exhibit significant deceptive physiological response patterns during polygraph examinations in an educational disciplinary setting. The overall physiological responses comprising respiratory, electrodermal, and cardiovascular activities consistently fall within the "No Significant Response" category, leading to a general classification of "Truthful" for the majority of the population.

Predictive Validity of Physiological Indicators: There is a very strong and statistically significant positive relationship between physiological responses and final polygraph examination results ($r = .846$, $p < .001$). This confirms that the Empirical Scoring System (ESS) effectively utilizes recorded autonomic nervous system changes to determine truthfulness, validating the instrument's accuracy in capturing the physiological correlates of deception.

Variable Sensitivity to Specific Misconduct: Physiological reactivity varies depending on the nature of the school policy violated. While most responses indicate truthfulness, specific inquiries such as those regarding missing class activities due to drunkenness elicit stronger physiological reactions categorized as "Deceitful," suggesting that the perceived seriousness or personal impact of a violation influences the detectability of lying.

Primary vs. Secondary Validation Factors: Physiological responses of the subject/participant serve as the primary, and most reliable basis for determining the validity of polygraph outcomes. In contrast, the relationship between physiological data and post-test interview outcomes is comparatively weak, indicating that while interviews provide qualitative explanation, they should be treated as secondary indicators rather than primary validation metrics in a standardized disciplinary framework.

Basis for a Standardized Design: The empirical connection between physiological reactivity and polygraph scoring justifies the development of a structured Polygraph Examination Reliability and Validation Design. This design, rooted in objective numerical analysis rather than subjective interpretation, provides a scientifically rational foundation for enhancing fairness and accountability in institutional disciplinary proceedings.

6.0. Recommendations

1. Standardization of Examination Procedures Educational institutions must enforce strict compliance with uniform polygraph phases, including structured pre-test interviews, standardized question formulations, and controlled testing environments. Adhering to this systematic sequence ensures that external or random human variables do not artificially distort the examinee's physiological baseline during testing.
2. Instrument Calibration and Data Integrity Disciplinary boards should establish strict quality assurance protocols that mandate the routine calibration of pneumograph, electrodermal activity (EDA), and cardiograph sensors prior to every individual session. Actively validating signal quality before data interpretation eliminates environmental noise and physical artifacts, which are the leading causes of inconclusive field outcomes.
3. Standardized Scoring and Inter-Examiner Verification Examiners must utilize evidence-based numerical scoring frameworks like the Empirical Scoring System (ESS) to objectively translate recorded autonomic adjustments into reliable diagnostic decisions. To ensure maximum institutional credibility, high-stakes cases should undergo a "blind spot check" where independent specialist panels review the charts without prior knowledge of the student’s background.
4. Integration of Supplementary Behavioral Evidence Because the statistical relationship between physiological reactivity and a student's choice to confess is weak, post-test verbal disclosures must be treated as complex, situational choices rather than direct biological responses. Examiners should systematically document and categorize these behavioral cues to complement the numerical charts, providing a fairer and more comprehensive institutional assessment.
5. Ethical Safeguards and Demographic Moderation School administrations must institute clear ethical safeguards, ensuring all polygraph screenings function on a strictly voluntary basis anchored by informed

consent. Furthermore, examiners must actively screen for age, sex, and underlying medical conditions during the pre-test phase, immediately postponing the examination if an unstable baseline or temporary illness is detected.

Declaration

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Competing Interests Statement

The authors declare that they have no conflict of interest.

Consent for publication

The authors declared that they consented to the publication of this study.

Author's Contribution

Both the authors took part in literature review, analysis, and manuscript writing.

Informed Consent

All participants in this study voluntarily gave their informed consent prior to their involvement in the research.

Availability of data and material

Not applicable

Institutional Review Board Statement

This study was reviewed and approved by the Committee on Oral Examination and the Graduate School of Criminology and Criminal Justice of PHINMA Cagayan de Oro College.

Ethical Approval

Approved as part of the formal institutional evaluation process by the Panel of Examiners and the Dean of the School of Criminology and Criminal Justice at PHINMA Cagayan de Oro College on February 25, 2026.

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Declaration of Artificial Intelligence

Not applicable

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