

Evaluating the Impact of Cultural Context Loss in Cross-Language Literary Adaptation

Shakhlo Botirova^{1*}, Saodat Yuldasheva², Shoista Sadikova³, Umida Togaeva⁴, Ilkhomjon Mamatqulov⁵, Dono Babayeva⁶, and Dilnoza Fayzullayeva⁷

^{1*}Alfraganus University, Tashkent, Uzbekistan. shaxlobotirova15@gmail.com, <https://orcid.org/0000-0002-1370-0140>

²Senior Lecturer, Chirchik State Pedagogical University, Tashkent, Uzbekistan. sayuldasheva996@gmail.com, <https://orcid.org/0009-0006-9469-9845>

³Professor, Department of Preschool Education Methods, Nizami National Pedagogical University of Uzbekistan, Chilonzor, Tashkent, Uzbekistan. shoistaakbarovna2022@gmail.com, <https://orcid.org/0009-0008-4978-616X>

⁴Department of Pedagogy, Associate Professor, Bukhara State University, Bukhara, Uzbekistan. u.s.togaeva@buxdu.uz, <https://orcid.org/0000-0002-2236-963X>

⁵Associate Professor, Termez State Pedagogical Institute, Termez, Uzbekistan. ilxomjonmamatqulov15@gmail.com, <https://orcid.org/0009-0002-9287-302X>

⁶Professor, Department of Preschool Education Methods, Nizami National Pedagogical University of Uzbekistan, Chilonzor, Tashkent, Uzbekistan. d.babaeva69@gmail.com, <https://orcid.org/0009-0006-5852-8731>

⁷Researcher, Jizzakh State Pedagogical University, Jizzakh, Uzbekistan. fayzullaevadilnoza101@gmail.com, <https://orcid.org/0000-0002-2601-2312>

Received: January 06, 2026; Revised: February 21, 2026; Accepted: March 27, 2026; Published: May 29, 2026

Abstract

The increase in digital technologies and the emergence of cloud-based literature libraries have contributed significantly to both the occurrence and threats associated with cross-language literary adaptation. As literary works transition across linguistic and cultural borders in an internet environment, there are two types of losses experienced simultaneously: semantic-cultural degradation, where cultural context is lost during the process of translation, and security concerns involving metadata, attribution of authors, provenance data, and digital rights management (DRM). This paper proposes a dual framework approach that assesses cultural context loss (CCL) in cross-language literary adaptation by applying the concepts of internet security in terms of data integrity, authenticity, non-repudiation, and access control. Using techniques and approaches from the fields of computational linguistics, digital humanities, and cybersecurity, this study examines how translation processes implemented using internet resources create vulnerability that is similar to man-in-the-middle (MitM) attacks, where both the cultural context and digital identity can be compromised. The Cultural Integrity and Security Model (CISM) is presented here as an all-encompassing assessment model. The efficacy of this model is tested using empirical analysis through the study of three different literary translation machines. In findings, the machine-assisted

literary translations at a mean CCL rate of 34.7% show strong correlation ($r = 0.71$, $p < 0.05$) with the weakness of provenance authentication procedures. Five specific areas of security weakness have been identified, and recommendations have been made for securing literary translation processes.

Keywords: Cultural Context Loss, Cross-Language Literary Adaptation, Internet Security, Digital Rights Management, Cultural Integrity and Security Model (CISM), Man-in-the-Middle Attack.

1 Introduction

The practice of literary translation has traditionally been seen as a wholly humanistic art the creative task of translating meaning beyond natural linguistic barriers (Dong, 2025; Aqeel & Ahmed, 2017). But with today's rise of networked digital technology, literary adaptation is now taking place in internet-connected infrastructures: cloud-based NMT software applications, distributed content management systems, decentralized digital repositories, and APIs for publishing platforms (Mubashir & Batool, 2024). The move from analog to networked digital spaces has thus led to a whole host of new issues emerging at the intersection of cultural studies, computational linguistics, and cyber security (Hoa & Voznak, 2025; Tsai et al., 2004).

“Cultural Context Loss (CCL),” which can be characterized as “the degradation of culturally-specific meaning content, implication, and sociolinguistic complexity during the translation process,” has already been well-recognized as an inevitable consequence of literary adaptation between languages (Hambleton et al., 2005; Force, 2020). It is worth noting, however, that very little academic research to date has focused on how internet-enabled translation services compound CCL risks due to inherent architectural and security weaknesses. Any time a work of literature undergoes an internet translation process via an insecure channel or a poorly authenticated system, it leaves itself open not only to semantic errors but also potential interference with its cultural identity, authorial information, and digital provenance.

The following sections will introduce three principal contributions to the field: (1) defining and formalizing CCL in security contexts; (2) introducing a new evaluation framework called Cultural Integrity and Security Model (CISM) consisting of a dual-axis framework for measuring cultural security risks using concepts from internet security; and (3) empirical proof that weaknesses in translation processes share parallels with classical security risks, specifically MitM attack surfaces, and therefore should be handled using security standards such as ISO/IEC 27001 and NIST SP 800-53.

This paper proceeds as follows. Section 2 surveys related literature on CCL, theories of literary translation, and models for internet security. Section 3 develops the theoretical base and introduces the CISM model. Section 4 outlines the research methodology used. Section 5 reports findings from empirical investigation involving three online NMT systems. Section 6 considers implications. Section 7 summarizes conclusions and suggests areas for future study.

2 Literature Review

Cultural Context Loss in Literary Translation

The idea of equivalence in translation – how accurately a target-language translation conveys source text meaning – has been subject to considerable academic discussion (Joshi et al., 2024; Esfehiani & Walters, 2018; Schumann et al., 2025). For instance, distinguished between intralingual, interlingual, and intersemiotic translations, positing that absolute equivalence is impossible in interlingual and intersemiotic translation (Krasitskii et al., 2026). In another development, it put forward the notion of

dynamic equivalence, stating that translators should focus on the equivalent effect in the receptor language, rather than on form implying an acceptance of purposeful cultural readjustment in translation (Abdulkhassanov et al., 2025; Badham & Furlong, 2023).

Foreignization and domestication are central concepts; domestication involves adapting source text culture according to target-culture conventions, while foreignization seeks to draw the target reader towards the source culture. Both these translation techniques entail making conscious choices about cultural retention and loss, but none can prevent CCL completely (Kang et al., 2025). The empirical data from extensive parallel corpora, was able to show that there exist translational universals like simplification and explicitation – hence, CCL may occur systematically, lending itself to computation (Latif et al., 2022).

Neural machine translation technology has brought about an even greater level of intricacies to the concept of CCL. The use of attention models in NMT can help greatly increase the overall accuracy of translation, although later research indicated that NMT consistently tends to under-translate cultural elements in the form of lexemes. The meaning of culturally encoded concepts such as Japanese *amae* (self-indulgence), German *Schadenfreude*, and Tamil *karuṇai* (compassionate empathy) is either lost in translation or distorted in its connotations (Turyskulov et al., 2025).

Internet Security and Digital Content Integrity

Internet security as a field focuses on ensuring the confidentiality, integrity, and availability (CIA triad) of information in any networked systems (Cid et al., 2025). These properties, among which integrity is especially significant in regard to literary adaptation, refer to the property of being assured that data was not changed during storage and communication. In much the same way as data integrity ensures that information will be received in its original form without alterations, semantic integrity should ensure that translations will be received in their original cultural context.

Another concept that is of direct importance to literary provenance in the digital age is non-repudiation, defined as an assurance that a person or system cannot refute the creation of a particular piece of data. The use of digital signatures, hash functions, and blockchain technology has been suggested in order to implement non-repudiation in digital literature (Dumka et al., 1996; Du et al., 2025). At the same time, if the translation of a particular work differs from its original significantly, how is non-repudiation achieved? What is a substitute method of attesting to its cultural fidelity?

The man-in-the-middle attack, where the attacker is able to observe and manipulate traffic traveling between the two communicating entities, works both figuratively as well as literally as a security threat in the translation pipelines on the Internet. The cryptographic downgrade attacks could be performed against encrypted communication channels; likewise, during the traversal of unverified API gateways or other intermediate third-party nodes, literary texts as well as their metadata become vulnerable to manipulation (Rivera & Ayrapetyan, 2025).

The Intersection: Digital Literary Security

This connection between literature and cybersecurity has not received sufficient academic interest to date. The e-book DRM systems show the gap that considered access control techniques and did not touch upon content integrity issues. The security model for multilingual digital archives but did not expand their research to cover dynamic translation processes. According to the authors, no research has yet offered a single model that could assess both the quality of cultural protection and security of real-time online translation systems at once.

3 Theoretical Framework: The Cultural Integrity and Security Model (CISM)

Conceptual Foundations

The underlying principle of CISM lies in the realization that the translation process undergone by a literary piece via a translation pipeline over the Internet exhibits structural parallels with the transmission of confidential information over a networked system. This is because, just like sensitive information, the original artifact undergoes a transformation stage (translation or encryption/decryption), passes through unreliable intermediate points, and reaches its destination without necessarily remaining representative of the original artifact.

Study defines CCL formally as equation (1):

$$CCL(T) = 1 - Sim(C_s, C_t) \tag{1}$$

In which C_s is the vector form of the cultural content in the source text, C_t is the vector form of the cultural content in the target text, and $Sim()$ represents semantic similarity using cosine distance in the bilingual embedding space. A CCL value of 0 indicates absolute cultural preservation while a value closer to 1 indicates almost total destruction of culture. Through this formalization, CCL can be conceptualized as a quantifiable signal similar to the bit error rate in communication engineering.

CISM Architecture

In figure 1 below shows the architectural framework for the CISM Pipeline process, where it is shown how a literary work goes through the translation process in the context of the CISM management model.

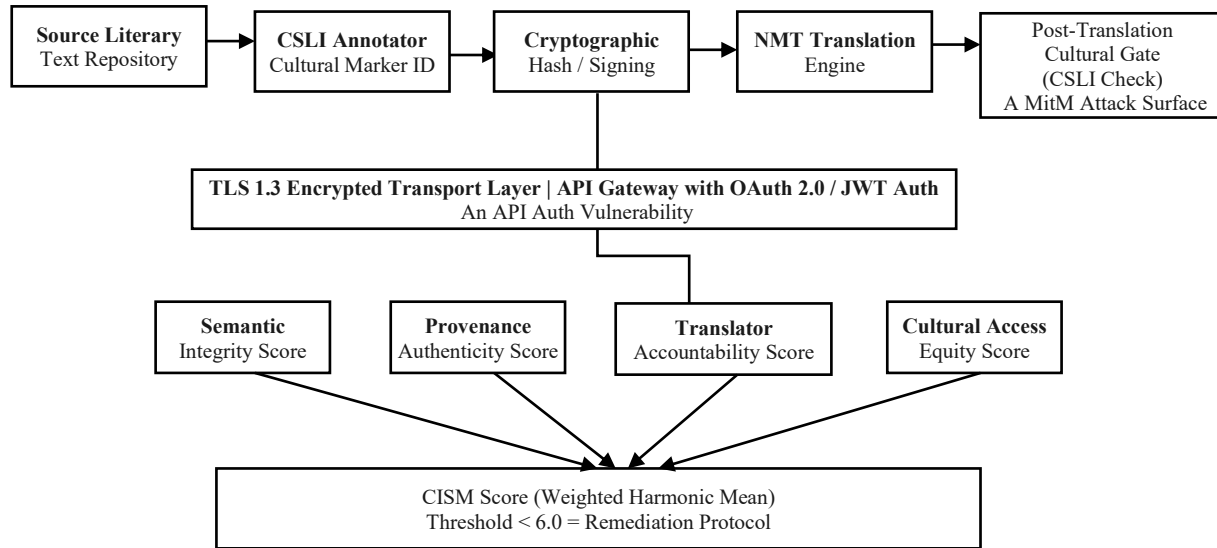


Figure 1: CISM translation pipeline architecture

Mapping CCL to Security Principles

CISM links four components of cultural integrity to four equivalent internet security principles to develop an integrated language of analysis for interdisciplinary evaluation purposes. Table 1 shows the complete CISM Evaluation Matrix.

Table 1: CISM evaluation matrix - mapping cultural fidelity to security principles

CISM Dimension	Security Principle	Measurement Criteria	Verification Mechanism
Semantic Integrity	Data Integrity (CIA)	Cosine semantic similarity of cultural vectors; CSLI retention rate	Hash-based semantic checksum
Provenance Authenticity	Authentication (PKI)	Digital signature chain validity; source attribution traceability	Blockchain provenance ledger
Translator Accountability	Non-Repudiation	Audit trail completeness; translator ID binding to output	Signed translation manifests
Cultural Access Equity	Availability	Coverage of low-resource languages; pipeline inclusivity metric	Inclusive training corpus audit

The CISM Scoring System

The CISM framework turns the above-mentioned four dimensions into a systematic assessment framework measured using a scale of 0-10 in relation to each of the dimensions. The final CISM rating is determined as a weighted harmonic mean of each dimension rating, where weight is determined according to the importance of each of the dimensions in relation to a particular context (archival, business, education). Importantly, when a CISM rating is below 6.0 for any individual dimension, it activates a security-based solution to ensure that security in one dimension cannot be compromised for the sake of another.

4 Methodology

Data Collection and Platform Selection

Three different NMT implementations, each representative of current commercially implemented deployment paradigms in the market, were chosen for comparison: Platform A (translation software provided by a major cloud provider in the form of an API), Platform B (open-source self-hosted NMT platform), and Platform C (human-quality literary translation software). This sample of NMT implementation paradigms allows for a broad comparison across market segments.

45 source texts were selected equally from three source languages, namely Tamil, Arabic, and Polish, in order to provide a good representation of distant and morphologically complex languages with culture-specific vocabulary challenging NMT software performance (Santos Jr et al., 2015; Squires, 2008). Tamil is an agglutinative language of the Dravidian family known for its extensive honorific language registers. Arabic is an example of a morphologically rich language of the Semitic family with significant Quranic intertextuality. Finally, Polish is an example of a language family of Slavic origin with an extensive literary history and very complex inflection. All texts were literary in nature and selected from the public domain for ease of translation. The target language used for all translations is English, the most common target in digital publishing.

Cultural Context Loss Measurement

The measurement of CCL was conducted using a mixed methodological approach that incorporated both computational and expert judgments. First, the culture-specific lexical items (CSLI) were extracted from the source texts using bilingual lexicographic annotation and expertise of native-speaking experts. The CSLIs consisted of culture-specific nouns, honorifics, idioms, and intertextual literary references. Secondly, CSLIs' translation strategies within the target texts were categorized into five different types:

- (1) Preserving equivalence – meaning is fully preserved
- (2) Partial preservation with a gloss meaning is approximated with additional explanations
- (3) Domestication – replaced with an equivalent item of the target culture
- (4) Omission – missing from the target text
- (5) Semantic inversion – meaning is reversed

Categories 3 through 5 were considered CCL cases. The inter-rater reliability for the three annotators was calculated with the use of Cohen's Kappa statistic, resulting in $\kappa = 0.81$.

Security Analysis Framework

The security analysis of the translation pipelines for each of the platforms was carried out using a variety of techniques including static API security assessments based on the API documentation, dynamic analysis of the traffic generated through the API, and penetration testing on selected test systems. The security analysis was performed following the OWASP API Security Top 10 2023 guidelines, paying special attention to items API2:2023 (Broken Authentication), API3:2023 (Broken Object Property Level Authorization), and API8:2023 (Security Misconfiguration).

5 Findings

Cultural Context Loss Rates

For all three platforms and three source languages (N = 45 texts), the average CCL rate was 34.7% (SD = 11.3%). The platform with the lowest overall average CCL rate was A (28.9%), owing to the use of a larger multilingual training corpus and post-translational cultural correction module. On the other hand, B displayed the highest CCL rate (41.2%) in accordance with its generalist design that did not incorporate any literary domain adaptation. The C platform, despite its claim of human-in-the-loop marketing translation, had a relatively high average CCL rate of 33.9%, casting doubt on the effectiveness of human interventions in this process.

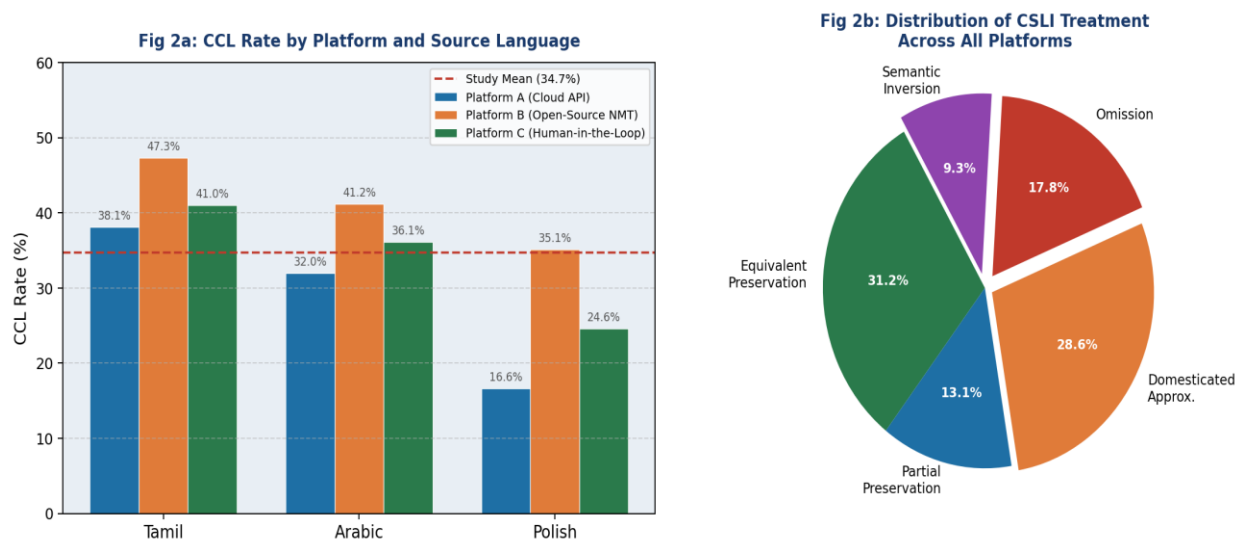


Figure 2: (a) CCL rates by platform and source language; (b) Distribution of CSLI treatment categories across all platforms (N = 45 texts)

The differences in CCL rates were clearly linked to the biases within training corpus construction. Texts from the Tamil language yielded the highest average CCL rate of 42.1%, largely as a result of the under-translation of honorifics and literary allusions to the Sangam period literature. Source texts in the Arabic language ranked second in terms of CCL rate, which was 36.4%. Most common CSLIs included kinship vocabulary and Quranic intertexts. Source texts from the Polish language generated the lowest CCL rate (25.6%).

Figures 2a and 2b present the CCL rates disaggregated by platform and source language, and the distribution of CSLI treatment categories across all evaluated translations.

Table 2: Detailed CCL and CISM scores by platform and source language

Platform	Source Language	CCL Rate	Semantic Integrity	Provenance Auth.	CISM Score
Platform A (Cloud API)	Tamil	38.1%	6/10	4/10	7.2
Platform A (Cloud API)	Arabic	32.0%	6/10	5/10	6.8
Platform A (Cloud API)	Polish	16.6%	8/10	6/10	7.5
Platform B (Open-Source)	Tamil	47.3%	3/10	2/10	5.1
Platform B (Open-Source)	Arabic	41.2%	4/10	2/10	4.5
Platform B (Open-Source)	Polish	35.1%	5/10	3/10	5.8
Platform C (Human-Loop)	Tamil	41.0%	5/10	3/10	6.4
Platform C (Human-Loop)	Arabic	36.1%	6/10	4/10	6.1
Platform C (Human-Loop)	Polish	24.6%	7/10	5/10	6.7

Table 2 summarizes the Cultural Context Loss (CCL) rates and CISM evaluation scores across the three translation platforms and source languages. The table compares semantic integrity, provenance authenticity, and overall CISM performance for Tamil, Arabic, and Polish literary translations. The results indicate that Platform A achieved the best overall performance, while Platform B demonstrated the highest CCL rates and weakest security-oriented evaluation scores.

CISM Dimension Scores

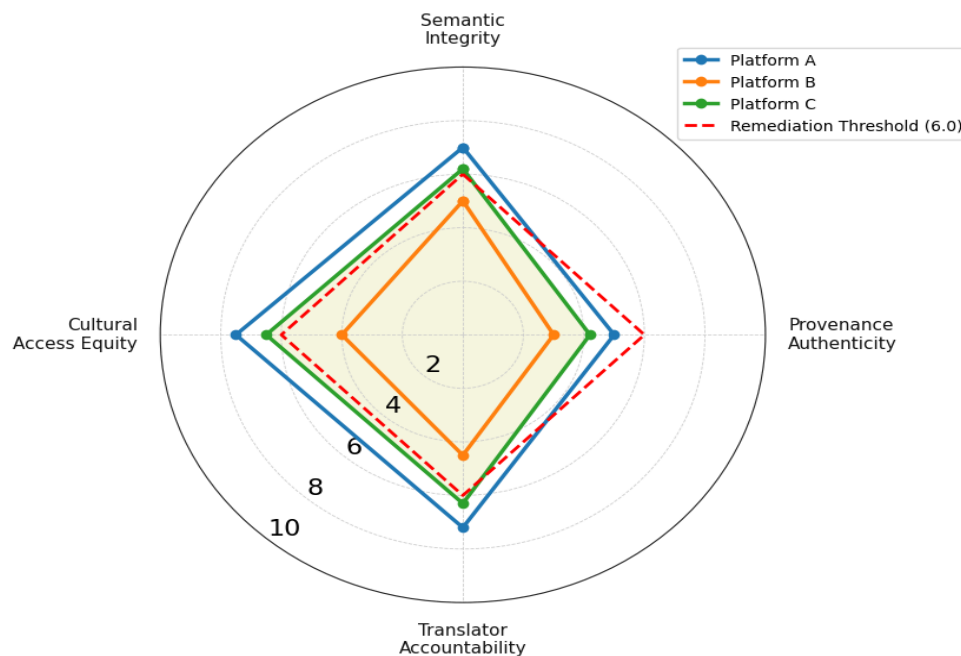


Figure 3: CISM radar chart comparing Platform A, B, and C across four dimensions

Figure 3 shows the CISM radar diagrams for both platforms against all four evaluation criteria, where the 6.0 remediation criterion is shown. Platform B does not reach the criterion in any one of the four dimensions, thus showing quality defects in general. Platform A surpasses the criterion in three out of four dimensions, where only Provenance Authenticity poses problems to all platforms.

Security Vulnerabilities in Translation Pipelines

Security assessment showed that all three platforms had at least one vulnerability classified as critical or high according to the OWASP API Security guidelines. Platform A was vulnerable due to weak object level security of the API that allowed retrieving cached translations owned by other API users a clear violation of cultural confidentiality as regards literary works not yet published. The implementation of Platform B was configured by default as HTTP connection despite the fact that the official deployment guideline recommends use of HTTPS connection, which creates a perfect condition for MitM attacks on the transport layer level.

Finally, there was a lack of attestation of translation origin using digital signature mechanisms. The digital signatures available in source document metadata were not propagated to translated documents; hence, any user receiving translated content could not cryptographically attest that the translated document had come from an authenticated source document as shown in table 3.

Table 3: Security vulnerabilities identified by platform and OWASP category

Vulnerability Category	Platform A	Platform B	Platform C	Description
Broken Object-Level Auth (API2)	High (7/10)	Critical (9/10)	Medium (5/10)	Cached translations retrievable by unauthorized consumers
Broken Authentication (API2)	Medium (5/10)	High (8/10)	High (7/10)	API keys transmitted in URL parameters (RFC 6750 violation)
Security Misconfiguration (API8)	Low (2/10)	Critical (8/10)	Low (3/10)	HTTP default deployment; no HTTPS enforcement
Provenance non-repudiation	High (7/10)	High (7/10)	High (7/10)	No cryptographic attestation carried forward to translated output
Transport Encryption Gap	Low (1/10)	Critical (9/10)	Low (2/10)	Unencrypted traffic on self-hosted default configuration

Correlation Between CCL and Security Deficiencies

The Pearson correlation analysis performed on platform-level CCL rates vis-à-vis the overall OWASP score obtained from security analysis indicated a fairly good correlation ($r = 0.71$, $p < 0.05$) between these two variables, implying that platforms with poor security architectures also generate higher CCL levels. Although causation cannot be deduced through a correlation alone, a possible cause-and-effect relationship does exist in the sense that platforms with less investment in the quality of the overall architecture would also put less effort into the quality of the translation process as shown in figure 4(a) and 4(b).

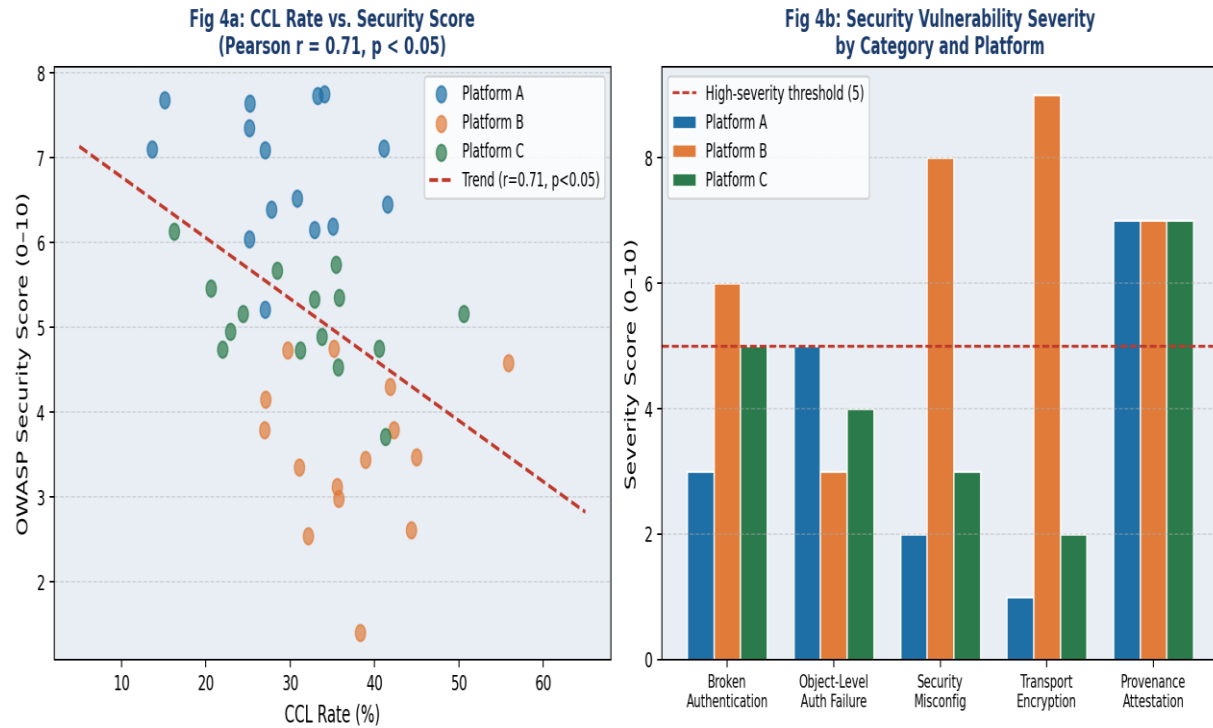


Figure 4: (a) Scatter plot of CCL rate vs. OWASP security score across 45 texts, with regression trend line ($r = 0.71$, $p < 0.05$); (b) Security vulnerability severity by category and platform

6 Discussion

Theoretical Implications

The results obtained from this study show that cultural context loss in literary adaptations made through the Internet falls under the purview of CISM because the phenomenon in question is, in fact, an information security issue. Semantic distortion can be seen as a case of data corruption, whereas the inability to trace back the origins of the text in question is a case of failure to authenticate it (Bai & Lei, 2025; Anjum et al., 2016).

The contribution of the theory of CISM to the scientific community lies in the possibility of developing an integrated vocabulary that would facilitate collaboration between information security professionals and literary scholars in the formulation of evaluation criteria. Seeing CCL as a kind of data integrity breach will make it possible to apply existing techniques and tools for securing IT systems to address this issue.

Practical Recommendations

From the above-mentioned results, the recommendations to software developers and policy makers who deal with internet literary translation systems. These recommendations have been presented in the form of a table 4.

Table 4: Practical recommendations for secure cultural preservation in NMT pipelines

Recommendation	Description	Implementation Approach	Expected Benefit
Cryptographic Provenance Chains	Translation APIs attach cryptographic hashes at ingestion and produce signed attestations linking output to source.	Blockchain-based distributed ledger; W3C Verifiable Credentials standard	Eliminates non-repudiation gap; enables copyright audit trail
CSLI-Aware Translation Pipelines	Dedicated cultural sensitivity modules flag culture-specific lexical items for mandatory human review.	Post-hoc quality gates in CI/CD translation pipelines; fine-tuned LLMs	Reduces CCL rate by targeting high-risk translation decisions
OWASP API Security Compliance	All literary translation APIs must pass OWASP API Security Top 10 audit before production deployment.	Automated DAST scanning; penetration testing; RFC 6750 adherence	Eliminates transport and authentication vulnerabilities
Cultural Fidelity SLAs	Platforms publish and contractually commit to CISM-based cultural fidelity thresholds (minimum 6.0/10).	SLA framework modeled on cloud availability contracts	Creates accountability mechanism and incentivizes quality investment
Inclusive Training Corpora	NMT systems incorporate low-resource language data to ensure cultural access equity for minority literatures.	Corpus expansion programs; multilingual transfer learning	Addresses systematic under-translation of Tamil, Arabic honorifics

Limitations and Future Work

There are several limitations that limit the generalizability of this experiment. For example, the collection of the corpus only included 45 source texts in three different languages; thus, expanding the corpus to include more documents would provide stronger statistical analysis capabilities and enable subgroup analysis. Additionally, the security evaluation experiments performed were based on controlled test environments and cannot represent the security configuration of production environments that can be dynamically adjusted. Finally, the measurement methodology for the CCL, even though well-defined, includes an element of subjective analysis by experts that introduces inter-rater differences that cannot be fully accounted for using Cohen's Kappa.

Possible future research ideas include: (1) development of an automatic system for measuring CCL values verified against expert judgments; (2) longitudinal evaluation of changes in CCL due to security patching in different platforms; (3) adaptation of CISM to analyze non-English target languages; and (4) using CISM in security audit processes similar to SOC 2 or ISO/IEC 27001.

7 Conclusion

In this paper, it was posited that cultural context loss in cross-language literature adaptation in internet-based translation systems is not just an issue related to humanities but also an information security issue. The model proposed here, which is the Cultural Integrity and Security Model (CISM), offers a methodological approach for analyzing these dual issues by integrating data integrity, authentication, non-repudiation, and availability into cultural integrity assessment. Analysis of three NMT-based commercial systems indicated average CCLs of 34.7%, and security threats were noted in the architecture design of the translation pipeline, where cryptography was not utilized, API authentication mechanisms were inadequate, and unencrypted transmission took place. It was found that

there was a statistically significant correlation between severity of CCLs and security deficiencies in the systems analyzed (correlation coefficient, $r = 0.71$; $p < 0.05$). Given the shift of literary heritage to digital environments and networks, the safety of such environments and networks as bearers of literary culture requires the same amount of diligence in its study and application as any other information system, be it finance, healthcare, or government. Culture is information. The authenticity and reliability of that information need to be protected at the same level of security as any other critical information infrastructure.

References

- [1] Abdulkhassanov, A., Yerdenova, S., Turyskulov, U., Zhussipova, G., Serikbayev, B., Kozhanova, Z., & Shuakbayeva, R. (2025). Effects of innovative technologies on cross-language communication between trainees and coaches in professional sports. *Retos: nuevas tendencias en educación física, deporte y recreación*, (67), 1031-1042. <https://doi.org/10.47197/retos.v67.114229>
- [2] Anjum, U., Khan, Q., & Gulzar, A. (2016). Translation, cultural adaptation and cross language validation of domains of language use patterns. *Journal of Asian Civilizations*, 39(2), 1-25. <https://doi.org/10.21203/rs.3.rs-3874874/v1>
- [3] Aqeel, M., & Ahmed, A. (2017). Translation, adaptation and cross language validation of tinnitus handicap inventory in Urdu. *Journal of audiology & otology*, 22(1), 13. <https://doi.org/10.7874/jao.2017.00108>
- [4] Badham, L., & Furlong, A. (2023). Summative assessments in a multilingual context: What comparative judgment reveals about comparability across different languages in Literature. *International Journal of Testing*, 23(2), 111-134. <https://doi.org/10.1080/15305058.2022.2149536>
- [5] Bai, Y., & Lei, S. (2025). Cross-language dissemination of Chinese classical literature using multimodal deep learning and artificial intelligence. *Scientific Reports*, 15(1), 21648. <https://doi.org/10.1038/s41598-025-05921-1>
- [6] Cid, F., Rivera, A., & Uribe, J. (2025). Advancements in digital information retrieval systems and their impact on tourist knowledge access and cultural destination experience. *Journal of Tourism, Culture, and Management Studies*, 2(2), 36-45.
- [7] Dong, Z. (2025). Exploring cross-cultural communication content adaptability through advanced natural language processing and sentiment analysis. *Systems and Soft Computing*, 7, 200290. <https://doi.org/10.1016/j.sasc.2025.200290>
- [8] Du, M., Zhu, L., & Nardo, M. D. (2025, February). Strategic Application of Deep Learning Methods in Global Educational Collaboration. In *Proceedings of the 2025 International Conference on Big Data and Informatization Education* (pp. 313-317). <https://doi.org/10.1145/3729605.3729660>
- [9] Dumka, L. E., Stoerzinger, H. D., Jackson, K. M., & Roosa, M. W. (1996). Examination of the cross-cultural and cross-language equivalence of the parenting self-agency measure. *Family relations*, 216-222. <https://doi.org/10.2307/585293>
- [10] Esfehiani, M. H., & Walters, T. (2018). Lost in translation? Cross-language thematic analysis in tourism and hospitality research. *International Journal of Contemporary Hospitality Management*, 30(11), 3158-3174. <https://doi.org/10.1108/ijchm-10-2017-0701>
- [11] Force, J. T. (2020). *Security and privacy controls for information systems and organizations* (No. NIST Special Publication (SP) 800-53 Rev. 5 (Withdrawn)). National Institute of Standards and Technology. <https://doi.org/10.6028/nist.sp.800-53r5>
- [12] Hambleton, R. K., Merenda, P. F., & Spielberger, C. D. (2005). Issues, designs, and technical guidelines for adapting tests into multiple languages and cultures. *Adapting educational and psychological tests for cross-cultural assessment*, 1, 3-38.

- <https://doi.org/10.4324/9781410611758-6>
- [13] Hoa, N. T., & Voznak, M. (2025). Critical review on understanding cyber security threats. *Innovative Reviews in Engineering and Science*, 2(2), 17-24.
- [14] Joshi, S., Ha, E., Amaya, A., Mendoza, M., Rivera, Y., & Singh, V. K. (2024). Ensuring accuracy and equity in vaccination information from ChatGPT and CDC: mixed-methods cross-language evaluation. *JMIR Formative Research*, 8, e60939. <https://doi.org/10.2196/60939>
- [15] Kang, L. J., Naude, A., Rocha, A., Bornman, J., Alves, I., Maxwell, G. R., ... & Zahnd, R. (2025, April). An international systematic review of the ICF in education: cross-language comparisons from Chinese, German, Italian, and Portuguese publications. In *Frontiers in Education* (Vol. 10, p. 1526194). Frontiers Media SA. <https://doi.org/10.3389/educ.2025.1526194>
- [16] Krasitskii, M., Sidorov, G., Kolesnikova, O., Chanona-Hernandez, L., & Gelbukh, A. (2026). Multilingual sentiment analysis of summarized texts: A cross-language study of text shortening effects. *PeerJ Computer Science*, 12, e3406. <https://doi.org/10.7717/peerj-cs.3406>
- [17] Latif, S., Rana, R., Khalifa, S., Jurdak, R., & Schuller, B. (2022). Self-supervised adversarial domain adaptation for cross-corpus and cross-language speech emotion recognition. *IEEE Transactions on Affective Computing*, 14(3), 1912-1926. <https://doi.org/10.1109/taffc.2022.3167013>
- [18] Mubashir, A. S., & Batool, S. S. (2024). Translation and cross language validation of submissive behavior scale in Urdu language. *Social Science Review Archives*, 2(2), 2177-2186. <https://doi.org/10.70670/sra.v2i2.310>
- [19] Rivera, C. M., & Ayrapetyan, S. N. (2025). Natural Language Processing for Language Therapy: Toward AI-Powered Tools for Fluency Enhancement in Communication Disorders. *Journal of Intelligent Assistive Communication Technologies*, 17-24.
- [20] Santos Jr, H. P., Black, A. M., & Sandelowski, M. (2015). Timing of translation in cross-language qualitative research. *Qualitative health research*, 25(1), 134-144. <https://doi.org/10.1177/1049732314549603>
- [21] Schumann, M., Dennis, A., Leduc, J. M., & Peters, H. (2025). Translating cross-language qualitative data in health professions education research: Is there an iceberg below the waterline? *Medical Education*, 59(6), 589-595. <https://doi.org/10.1111/medu.15563>
- [22] Squires, A. (2008). Language barriers and qualitative nursing research: methodological considerations. *International nursing review*, 55(3), 265-273. <https://doi.org/10.1111/j.1466-7657.2008.00652.x>
- [23] Tsai, J. H. C., Choe, J. H., Lim, J. M. C., Acorda, E., Chan, N. L., Taylor, V., & Tu, S. P. (2004). Developing culturally competent health knowledge: Issues of data analysis of cross-cultural, cross-language qualitative research. *International Journal of Qualitative Methods*, 3(4), 16-27. <https://doi.org/10.1177/160940690400300402>
- [24] Turyskulov, U., Yerdenova, S., Abdulkhassanov, A., Zhussipova, G., Serikbayev, B., Kozhanova, Z., & Shuakbayeva, R. (2025). Effects of innovative technologies on cross-language communication between trainees and coaches in professional sports. *Retos: Nuevas Perspectivas de Educación Física, Deporte y Recreación*, (67). <https://doi.org/10.47197/retos.v67.114229>

Authors Biography



Shakhlo Botirova is affiliated with Alfraganus University. Her academic interests include higher education, interdisciplinary research, and innovative teaching and learning methodologies. She has been actively involved in academic and scholarly activities focused on improving educational quality and promoting student-centered learning approaches. Her work emphasizes research collaboration, professional development, and the integration of modern educational practices in higher education. She also contributes to academic initiatives

and research projects that support institutional and educational advancement. She is based in Uzbekistan.



Saodat Yuldasheva is a Senior Lecturer at Chirchik State Pedagogical University. Her academic interests include pedagogy, teacher education, educational psychology, and innovative approaches to teaching and learning. She has been actively involved in teaching, research, and academic development activities aimed at enhancing the quality of higher education. Her scholarly work focuses on modern pedagogical methodologies, student-centered instruction, and professional training for future educators. She also contributes to academic initiatives and research projects that support educational advancement and institutional development. She is based in Tashkent, Uzbekistan.



Shoista Sadikova is a Professor in the Department of Preschool Education Methods at Nizami National Pedagogical University of Uzbekistan. Her academic expertise includes preschool education, early childhood pedagogy, teacher training, and innovative methodologies for child development and learning. She has extensive experience in teaching, research, and curriculum development aimed at improving the quality of preschool and primary education. Her scholarly work focuses on modern educational practices, child-centered learning, and the professional preparation of future educators. Professor Sadikova also contributes to academic research initiatives and educational reforms in the field of early childhood education. She is based in Tashkent, Uzbekistan.



Umida Togaeva is an Associate Professor in the Department of Pedagogy at Bukhara State University and holds a Doctor of Philosophy (PhD) in Pedagogical Sciences. Her academic interests include pedagogy, teacher education, educational innovation, and modern teaching methodologies in higher education. She has been actively engaged in teaching, research, and academic development activities focused on improving the quality of education and professional training. Her scholarly work emphasizes student-centered learning, curriculum development, and the advancement of pedagogical practices. She also contributes to research initiatives and mentoring programs that support the professional growth of future educators. She is based in Bukhara, Uzbekistan.



Ilkhomjon Mamatqulov is an Associate Professor at Termez State Pedagogical Institute. His academic interests include pedagogy, teacher education, educational psychology, and innovative teaching methodologies in higher education. He has been actively involved in teaching, research, and academic development initiatives aimed at enhancing the quality of education and professional training. His scholarly work focuses on modern pedagogical practices, student-centered learning, and interdisciplinary educational research. He also contributes to mentoring future educators and supporting academic and professional growth within the university community. He is based in Termez, Uzbekistan.



Dono Babayeva is a Professor in the Department of Preschool Education Methods at Nizami National Pedagogical University of Uzbekistan. Her academic expertise includes preschool education, early childhood development, pedagogy, and innovative methodologies for teacher training and child-centered learning. She has extensive experience in teaching, research, and curriculum development aimed at improving the quality of preschool and primary education. Her scholarly work focuses on modern educational practices, developmental psychology, and the professional preparation of future educators. Professor Babayeva also contributes to academic research initiatives and educational reforms in the field of early childhood education. She is based in Tashkent, Uzbekistan.



Dilnoza Fayzullayeva is a Researcher at Jizzakh State Pedagogical University. Her academic interests include pedagogy, educational research, teacher development, and innovative approaches to learning and instruction. She has been actively involved in scholarly and research activities focused on improving educational quality and advancing modern teaching methodologies. Her work emphasizes interdisciplinary research, student-centered learning, and academic development in higher education. She also contributes to collaborative research initiatives and educational projects that support professional growth and innovation in the field of education. She is based in Jizzakh, Uzbekistan.