

Examining the Relationship Among Artificial Intelligence Literacy, Cultural Literacy, and Intercultural Communication Proficiency of Philology Students

Yertay Sultan

Abai Kazakh National Pedagogical University, Almaty, Kazakhstan

Gulnaz Dautova¹

Al-Farabi Kazakh National University, Almaty, Kazakhstan

Juhriyansyah Dalle

Florida Gulf Coast University, Fort Myers, United States

Abstract: The purpose of the present study was to contextually describe philology students' artificial intelligence (AI) literacy, cultural literacy (CL), and intercultural communication proficiency (ICP) levels in Kazakhstan while examining how these three competencies differ in terms of gender and grade level. The study evaluated the predictive power of AI literacy and CL on ICP. It was conducted using a survey with a sample of 334 students studying in philology departments at four universities in Kazakhstan. Data collection tools were the Artificial Literacy Scale, Cultural Literacy Scale, and Intercultural Communication Competence Scale. Data were analyzed using independent t-tests, F-tests, and multiple regression analysis. The findings revealed that philology students' AI literacy was high, but their practical application skills were moderate. Male students were more successful in AI literacy, while female students had cultural and intercultural competencies. Significant improvement was observed across all three competencies as grade levels increased, with AI and cultural literacy accounting for 23.7% of intercultural communication competence. To improve AI skill sets, philology curricula should prioritize the practical use of AI tools, adopt gender-inclusive pedagogical approaches, create learning environments supported by peer coaching and mixed-task learning, integrate AI-supported critical thinking tasks, establish institutional-level ethical use policies, and provide faculty with AI integration training. Future research should include mixed-method and longitudinal studies.

Keywords: Artificial Intelligence Literacy, Cultural Literacy, Intercultural Communication Competence, Philology Students, Digital Humanities

With the global acceleration of digital transformation, Artificial Intelligence (AI) literacy is becoming a core competency in higher education, which is being addressed alongside transdisciplinary outcomes. At the university level, AI literacy encompasses conceptual understanding, technical skills, ethical awareness, and empowerment, and how these components are articulated across different cultural contexts is becoming increasingly essential (Perchik et al., 2023). However, cross-cultural differences and field-specific needs complicate standard definitions and measurement approaches for AI literacy, necessitating context-sensitive redefinition of indicators related to Cultural and Intercultural Communication (CIC) (Wang et al., 2023; Sesikir et al., 2024; Szecsi, 2025).

¹ Corresponding Author: Acting Associate Professor of the Department of Kazakh Literature and Theory of Literature, Al-Farabi Kazakh National University, Almaty, Republic of Kazakhstan. Email: gulnaz.dautova@kaznu.edu.kz

While relevant research demonstrates the implementation of AI-based learning experiences in higher education, a need exists for study designs that reveal the effect of these experiences on CIC components such as bias awareness, sensitivity to representation, and ethical reasoning (Liang et al., 2023; Zhou et al., 2025). Students' knowledge, attitudes, and behavior patterns toward AI vary across sociocultural contexts, necessitating contextual modeling of CL and ICP (Intercultural Communication Proficiency) outcomes. In this context, AI literacy emerges not merely as a technological trend but also as a multilayered learning experience because identity construction is intertwined with cultural relationality and communicative activity, as a phenomenon that requires examination across disciplines (Wang et al., 2023).

Within the context of philology, AI literacy should encompass the structural properties of language and its interactions with various cultural situations, contextually appropriate strategic communication, and sensitivity to representation as teaching objectives (Klimova & Chen, 2024). While technical accuracy increases even if AI-based language-learning systems ignore cultural context, ICP components such as intercultural negotiation, pragmatic appropriateness, and reading multimodal cues may not be supported to the same extent (Long & Lin, 2022).

The rise of AI literacy brings new opportunities as well as new responsibilities to the field of philology. However, detailed evidence on the interaction of CL and ICP with AI in discipline-specific contexts remains limited (Liang et al., 2023; Zhou et al., 2025). While the effects of AI-based learning environments on intercultural communication processes are promising, they do not show a consistent direction. Generative AI facilitates the exploration of diverse perspectives and increases strategy experimentation through dialogue simulations and cultural scenarios (Zheng & Stewart, 2024; Long & Lin, 2022). However, the formulaic responses of large language models can undermine critical reading and lead to a singular narrative in ICP components such as face-guarding, negotiation, and discourse cohesion. While guidance and reflective inquiry steps in instructional design can mitigate these risks, they are not equally effective in all contexts (Klimova & Chen, 2024). The replacement of peer interactions with artificial interactions can limit the experience of nuanced skills such as gesture and pragmatic appropriateness. Furthermore, AI applications supported by real-life dilemmas, role-plays, and discussion-based tasks can strengthen indicators of empathy, ethical reasoning, and sensitivity to representation (Zheng & Stewart, 2024).

This study aims to contextually describe the AI literacy, CL, and ICP levels of philology students in Kazakhstan and examine how these three competencies differ according to gender and grade level, and also to evaluate the predictive power of AI literacy and CL on ICP. To this end, the study sought answers to the following questions:

1. What are the participants' AI literacy, ICP, and CL levels?
2. Do the participants' AI literacy, ICP, and CL levels differ regarding gender?
3. Do the participants' AI literacy, ICP, and CL levels differ regarding grade level?
4. Do the participants' AI literacy and CL levels significantly predict their ICP levels?

Artificial Intelligence Literacy in Higher Education and Cultural Literacy

In the context of higher education, AI literacy is defined by the dimensions of conceptual understanding, ethical awareness, validation, and empowerment (Wang et al., 2023; Yim & Su, 2025; Omoniyi, 2025). Students with high self-efficacy can more effectively manage their cognitive load by integrating information verification and source evaluation into their production phases. Assessment practices structured with clear principles strengthen metacognitive awareness by ensuring the responsible integration of AI into learning environments (Erdem Coşgun, 2025). In contrast, low levels of AI literacy are associated with overconfident tendencies and weaknesses in ethical attribution. Furthermore, activities based

on error detection and justification conducted with chatbots can increase students' morphological and discursive awareness (Young et al., 2024). Encouraging multiple perspectives in interdisciplinary tasks elevates learner-student interactions to a more authentic level, while acceptable use policies developed at the institutional level contribute to the clarification of ethical boundaries and responsibilities. However, if data transparency and copyright are not addressed holistically, AI literacy risks becoming superficial. Therefore, design quality and clarity in assessment processes emerge as key determinants of learning outcomes. In this context, AI literacy should not be viewed solely as a technical skill, but as a way of thinking developed around critical validation, responsible production, and ethical awareness. At this point, a conceptual intersection between AI literacy and CL emerges.

In digital ecosystems, visual iconography, platform norms, and metatextual indicators expand the scope of CL, while critical pedagogy approaches emphasize the importance of ethical positioning (Chaika, 2024; Kibici, 2022; Miranda et al., 2025). In this setting, the use of AI tools in educational environments can both support and threaten the interpretive nature of CL. Activities such as critical case analysis, dilemma-based story rewriting, intertextual tracing, counterexample generation, and source traceability embody CL's performance-based indicators, while AI tools provide speed and accessibility in these processes. However, because AI translation and production tools risk flattening cultural nuances, they must be used with critical awareness (Tenzer et al., 2024). At this point, the interaction between AI literacy and CL is shaped not only by technological proficiency but also by ethical sensitivity, cultural representation, and critical interpretive power. Tasks such as bilingual corpus tracking, terminological tracing, and reasoned editing enhance the pedagogical value of this interaction. Moreover, AI-supported semantic maps and visual relationship networks schematize complex cultural structures, making multilayered meanings visible (Kara, 2024; Pérez-Sánchez et al., 2025).

However, low AI literacy can lead users to overconfidence in AI outputs and superficial CL indicators. Therefore, multiple output comparison, second-source verification, and critical inquiry strategies should be integral to informed use (Tully et al., 2025). Furthermore, when platform transparency and referencing practices are not clearly defined, ethical attribution and the chain of evidence are weakened. Therefore, AI tools should not be positioned as final authorities, but rather as pedagogical partners that foster critical thinking and cultural sensitivity (Lee, 2025). In this context, AI literacy and cultural literacy should be viewed as two complementary conceptual areas. As the role of AI in education expands, maintaining the balance between cultural meaning-making and ethical responsibility will form the basis of sustainable learning ecosystems at both the individual and institutional levels.

Intercultural Communication Proficiency in Philology Students

In today's rapidly globalizing world, ICP has become a critical skill area for students studying philology. Languages are not just words and grammatical structures but also carriers of cultural meanings. Therefore, linguistic accuracy alone is not sufficient for effective communication (Popescu & Iordachescu, 2015). ICP should be considered as a holistic competence encompassing pragmatic appropriateness, discourse management, negotiation of meaning, and sensitivity to cultural contexts. For philology students, this competence is closely linked to the ability to decode linguistic and social codes in diverse cultural settings (Kantelinen & Hildén, 2016). ICP encompasses the cognitive, affective, and behavioral dimensions that enable individuals to interact meaningfully, respectfully, and effectively with individuals from diverse cultural backgrounds. Throughout the language learning process, philology students not only acquire vocabulary and grammatical knowledge but also internalize the social norms, communication styles, and cultural references of the target language. In this context, ICP

emerges as a higher-level skill that goes beyond linguistic competence and encompasses the individual's cultural awareness, empathic understanding, and communication strategies (Chaika, 2024).

Philology education provides a learning environment conducive to the development of intercultural sensitivity because it allows students to analyze the linguistic and literary products of different cultures. However, students must develop an open-minded and critical perspective free from cultural biases (Maloivan & Dyrda, 2025). ICP is strengthened not only by accumulated knowledge but also by interactive experiences, reflective thinking, and self-awareness. Therefore, the inclusion of course content and practical activities that support intercultural communication skills in philology programs directly impacts students' development in this area (Kantelinén & Hildén, 2016). This competence also requires an understanding of the sociopragmatic dimensions of language. Students should be able to observe how language functions in different cultures, and how politeness strategies, indirect speech forms, and discourse organization elements differ. For example, while directness is perceived as a positive form of communication in one culture, indirectness and face-saving strategies may be preferred in another. Being aware of these differences enables philology students to exhibit more effective and appropriate behaviors both in their academic analyses and in real communication situations (Popescu & Iordachescu, 2015).

The literature indicates that studies explicitly modeling the relationships between AI literacy and CL and testing their impact on ICP are limited. Existing research primarily focuses on preservice teachers and the K–12 level, leaving the discipline-specific needs of philology students in the background (Tenberga & Daniela, 2024; Yim & Su, 2025). Furthermore, evaluations of AI-based programs are often conducted using general competency indicators. Philology-specific outcomes such as intercultural communication strategies, ethical reasoning, and pragmatic performance are inadequately addressed as separate variables (Kong et al., 2023; Wang et al., 2023; Foo, 2023). While research on the role of AI in language education is substantial, analytical designs that test causal and mediating relationships among variables are scarce (Liang et al., 2023). Although there is research on how generative AI shapes cultural narratives, the body of evidence supporting its translation into scalable program designs is limited (Lee, 2025; Zheng & Stewart, 2024). The CL literature is robust in the health and education fields. However, the concept's articulation with AI literacy and its impact on ICP has been explored only limitedly in the philological context (Chaika, 2024; Liu et al., 2021; Wut et al., 2025; Artanti & Azhari, 2025). Research lacking in data diversity and model transparency hinders comparability. Therefore, comprehensive designs that consider variables together, adapt and validate measurement tools, and test them in conjunction with communicative outcomes are needed (Long & Lin, 2022).

This study's theoretical contribution lies in clarifying the effects of AI literacy and CL on ICP by testing them in the same model. Findings regarding program design can provide concrete guidelines for aligning AI-enabled activities with communication strategies, ethical reasoning, and pragmatic performance indicators. Generative AI's capabilities, such as accountability, data transparency, and source inquiry, can become visible. These contributions can pave the way for the redefinition of learning outcomes and competency-based curriculum updates.

Method

Research Model

The current study, designed using a correlational research design, is a quantitative research method examining the relationships among philology students' AI literacy, cultural literacy, and perceptions of intercultural communication competence (Fraenkel et al., 2012). In

this context, the relationships among variables were examined, and predictive relationships between them were explained. Furthermore, participants' AI literacy, cultural literacy, and intercultural communication competence were compared in terms of gender and grade level.

Population and Sample

The population of this study consists 544 of students continuing their education in all philology departments in Kazakhstan. Because reaching these students was difficult due to time, transportation, and other factors, a sampling approach was applied, and students from philology departments at four state universities in Kazakhstan were selected as the sample. Random sampling was used. In random sampling, all units in a population have an equal probability of being selected for the sample. It is the most effective method for selecting a representative sample (Noor et al., 2022). Three hundred and thirty-four students studying in philology departments, of which 223 were females and 111 were males, responded to the survey.

Data Collection Tools

Artificial Literacy Scale

The scale was developed by Wang et al. (2023) and used in determining the AI literacy levels of philology students. The researchers used the Kazakh version of the scale. The original form of the AI literacy scale consists of 12 items. As a result of the factor analysis performed on this scale, a four-dimensional structure was obtained: awareness, usage, evaluation, and ethics. Each subdimension consists of three items. Negative statements in the scale were reverse-coded and included in the analysis. The Kazakh form of the scale explained 62.73% of the total variance. In addition, the Cronbach's alpha (α) value, which is the reliability coefficient of the scale, was 0.91. The reliability coefficient of the original form of the scale was 0.93.

Cultural Literacy Scale

The scale, originally developed by Kılıçoğlu Kıvrak (2023), was adapted to Kazakh by the researchers. The scale, whose construct validity was tested using exploratory factor analysis, consists of three subdimensions (cultural competence, cultural awareness, and construction of cultural knowledge) and 16 items (Appendix A). A high total mean score on the 5-point Likert-type scale indicates a high level of cultural literacy among participants, while a low total mean score indicates a low level of cultural literacy. The Cronbach's alpha reliability coefficient of the scale was 0.90. The reliability coefficient of the scale was 0.88 in the sample of Kazakh philology students.

Intercultural Communication Competence Scale

A Likert-type measurement tool developed by Arasaratnam (2009) was used to measure the cultural communication competence of the participating students. Validity analysis conducted on the data from the seven-item scale revealed a two-dimensional structure: cognitive and affective (Appendix B). Composite reliability and Cronbach's alpha internal consistency reliability coefficients were calculated to determine the internal consistency of the intercultural communication competence scale. Analyses revealed a Cronbach's alpha of 0.73 for the overall scale, 0.77 for the cognitive dimension, and 0.80 for the affective dimension.

Data Analysis

To facilitate faster analysis of data obtained using the data collection tools, the data collection tools were digitized using Google Forms. Surveys were collected between March and May. Three scales, including demographic information, were sent digitally to each participant in accordance with the necessary legal permissions and ethical statements. Based on the feedback from 335 participants, the raw data were processed, and data from one student with incomplete or incorrect data were removed from the data set.

Statistical analyses were then conducted to test whether the data were normally distributed. In this context, skewness and kurtosis coefficients were determined. Because the study group exceeded 50 students, the Kolmogorov-Smirnov normality test was applied. The analysis determined that the distribution was normal ($p > .05$), and the skewness and kurtosis values of the data were distributed within the range of $+1.5/-1.5$. Based on this finding, the data set exhibited a homogeneous distribution (Tabachnick & Fidel, 2015). Parametric statistical techniques, including the independent t-test, F-test, and multiple regression analysis, were used. Additionally, in the evaluation of the answers given to the scale questions, ranges of 1.00-1.80 Strongly Disagree; 1.81-2.60 Disagree; 2.61-3.40 Undecided; 3.41-4.20 Agree; 4.21-5.00 Strongly Agree were used. The ranges were assumed to be equal, and the score range for the arithmetic means was calculated as $(\text{Highest Value}-\text{Lowest Value})/5 = (5-1)/5 = 4/5 = 0.80$.

Findings

Table 1 presents the Participants' AI Literacy, ICP, and CL levels.

Table 1

Descriptive Information Regarding the Scores of Philology Students on Artificial Intelligence Literacy, Intercultural Communication Competence, and Cultural Literacy Scales

		N	Minimum	Maximum	Mean	SD
Artificial Intelligence Literacy	Awareness	334	0.06	0.21	0.18	0.05
	Usage	334	0.09	0.21	0.15	0.04
	Evaluation	334	0.04	5.00	3.72	0.78
	Ethics	334	1.67	5.00	3.60	0.65
	AI Literacy Total	334	2.08	5.00	3.61	0.49
Intercultural Communication Competence	Cognitive	334	1.00	5.00	3.83	0.97
	Emotional	334	1.00	5.00	3.79	0.78
	Intercultural Communication Competence Total	334	1.00	5.00	3.81	0.81
	Cultural Competence	334	1.25	5.00	3.51	1.01
Cultural Literacy	Cultural Awareness	334	2.67	5.00	4.24	0.63
	Constructing Cultural Knowledge	334	2.00	5.00	3.60	0.69
	Cultural Literacy	334	2.50	5.00	3.79	0.50

To answer the first research question, the participants' scores on four sub-dimensions of the artificial intelligence scale (Awareness, Usage, Evaluation, Ethics), two sub-dimensions of the intercultural communication competence scale (cognitive and affective), and three sub-dimensions of the cultural literacy scale (cultural competence, cultural awareness, and construction of cultural knowledge) were calculated and examined (Table 1). The results showed that the participants had a moderate level of competence in the usage sub-dimension of

the artificial intelligence scale. However, overall, the participants had a high level of artificial intelligence literacy. Participants were found to have high competence in both the overall and sub-dimensions of the intercultural communication competence scale. Finally, their cultural awareness, a sub-dimension of the cultural literacy scale, was found to be at a very high level. Generally, philology students have a high level of cultural literacy.

Another sub-problem of the research is, "Do participants' artificial intelligence literacy, intercultural communication competence, and cultural literacy differ regarding gender?" To answer this question, the participants' mean scores on these three scales and their subscales were compared and examined (Table 2).

Table 2

Comparison of Philology Students' Artificial Intelligence Literacy, Intercultural Communication Competence, and Cultural Literacy Regarding gender

	Gender	N	Mean	SD	t	p
Awareness	Female	223	3.77	0.69	-0.346	0.730
	Male	111	3.80	0.56		
Usage	Female	223	3.30	0.64	-1.990	0.047*
	Male	111	3.46	0.51		
Evaluation	Female	223	3.66	0.80	-2.166	0.031*
	Male	111	3.85	0.71		
Ethics	Female	223	3.55	0.65	-1.958	0.068
	Male	111	3.70	0.65		
AI Literacy (Total)	Female	223	3.56	0.52	-2.156	0.031*
	Male	111	3.71	0.44		
Cognitive	Female	223	3.92	1.00	2.447	0.015*
	Male	111	3.65	0.88		
Emotional	Female	223	3.83	0.76	1.020	0.308
	Male	111	3.72	0.80		
Intercultural Communication Competence (Total)	Female	223	3.88	0.82	1.971	0.048*
	Male	111	3.68	0.77		
Cultural Competence	Female	223	3.52	1.05	0.085	0.932
	Male	111	3.51	0.95		
Cultural Awareness	Female	223	4.29	0.58	2.208	0.028*
	Male	111	4.13	0.71		
Constructing Knowledge	Female	223	3.69	0.68	3.155	0.002*
	Male	111	3.44	0.68		
Cultural Literacy	Female	223	3.83	0.50	2.445	0.015*
	Male	111	3.69	0.47		

*p<0.05.

The mean scores calculated in the awareness sub-dimension of the artificial intelligence scale did not show a significant difference according to gender ($p>0.05$). On the other hand, the mean scores calculated in the total of the usage, evaluation, ethics, and artificial intelligence literacy scales of the same scale showed a significant difference in terms of gender ($p<0.05$).

According to the means of the groups, male participants' artificial intelligence literacy was found to be higher. The mean scores calculated in the emotional sub-dimension of the intercultural communication scale did not show a significant difference according to gender ($p>0.05$). On the other hand, the mean scores calculated in the cognitive sub-dimension and the total of the same scale showed a significant difference regarding gender ($p<0.05$). Considering the means of the groups, female participants' intercultural communication competence was found to be higher. The mean scores calculated in the cultural competence sub-dimension of the cultural literacy scale did not show a significant difference regarding gender ($p>0.05$), but the mean scores calculated in the total of the cultural awareness and cultural knowledge construction sub-dimensions of the same scale showed a significant difference considering the gender variable ($p<0.05$). According to the group means, female participants' cultural literacy was found to be significantly higher than that of males.

Another sub-problem of the study was, "Do participants' artificial intelligence literacy, intercultural communication competence, and cultural literacy differ regarding grade level?" To answer this question, participants' mean scores on these three scales and their subscales were compared and examined in terms of grade level (Table 3).

Table 3

Comparison of Philology Students' Artificial Intelligence Literacy, Intercultural Communication Competence, and Cultural Literacy Regarding Grade Level

	Grade	N	Mean	SD	F	p
Awareness	1st	84	3.64	0.52	4.903	0.002*
	2nd	88	3.66	0.75		
	3rd	93	3.92	0.65		
	4th	69	3.91	0.57		
Usage	1st	84	3.27	0.51	2.513	0.058
	2nd	88	3.31	0.57		
	3rd	93	3.36	0.64		
	4th	69	3.52	0.67		
Evaluation	1st	84	3.46	0.62	7.248	0.000*
	2nd	88	3.63	0.85		
	3rd	93	3.92	0.73		
	4th	69	3.90	0.83		
Ethics	1st	84	3.46	0.55	4.199	0.006*
	2nd	88	3.51	0.74		
	3rd	93	3.75	0.61		
	4th	69	3.70	0.64		
AI Literacy (Total)	1st	84	3.46	0.38	8.081	0.000*
	2nd	88	3.52	0.56		
	3rd	93	3.74	0.49		
	4th	69	3.76	0.46		
Cognitive	1st	84	3.71	0.95	4.484	0.004*
	2nd	88	3.61	1.00		
	3rd	93	3.92	1.00		

	4th	69	4.13	0.83		
Emotional	1st	84	3.66	0.73	3.373	0.019*
	2nd	88	3.66	0.88		
	3rd	93	3.91	0.72		
	4th	69	3.95	0.73		
Intercultural Communication Competence (Total)	1st	84	3.69	0.74	4.565	0.004*
	2nd	88	3.63	0.89		
	3rd	93	3.91	0.8		
	4th	69	4.04	0.71		
Cultural Competence	1st	84	3.45	1.09	5.229	0.002*
	2nd	88	3.34	0.96		
	3rd	93	3.44	1.11		
	4th	69	3.93	0.71		
Cultural Awareness	1st	84	4.11	0.59	7.213	0.000*
	2nd	88	4.08	0.64		
	3rd	93	4.35	0.64		
	4th	69	4.45	0.56		
Constructing Cultural Knowledge	1st	84	3.47	0.71	3.794	0.011*
	2nd	88	3.51	0.65		
	3rd	93	3.78	0.73		
	4th	69	3.66	0.58		
Cultural Literacy (Total)	1st	84	3.67	0.49	10.093	0.000*
	2nd	88	3.64	0.42		
	3rd	93	3.86	0.52		
	4th	69	4.01	0.47		

*p<0.05.

As seen in Table 3, the means calculated for all sub-dimensions and total scores of the AI scale had significant differences regarding grade level ($p<0.05$). Further analyses using the Scheffe test revealed that fourth-grade students had higher means on the usage dimension of the AI scale, while third- and fourth-grade students had higher means on the other sub-dimensions. In general, as the grade level increased, students' artificial intelligence literacy increased too. Fourth-grade students scored higher on the cognitive sub-scale of the intercultural communication competence scale, while third- and fourth-grade students scored higher on the emotional sub-dimension and total. Finally, fourth-grade students scored higher on the cultural competence sub-dimension of the cultural literacy scale, while third- and fourth-grade students scored higher on the other sub-dimensions and total scale scores. As the philology students' grade level increased, their cultural literacy also increased.

Table 4 presents the results of the regression analysis developed to test the effect of philology department students' artificial intelligence literacy and cultural literacy on their intercultural communication competence.

Table 4

Regression Analysis Results Regarding the Level of Prediction of Cultural Literacy of Philology Students' Artificial Intelligence Literacy and Intercultural Communication Competence

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	0.396	0.363		1.093	0.275
Artificial Intelligence Literacy	0.198	0.082	0.121	2.420	0.016
Cultural Literacy	0.713	0.082	0.438	8.739	0.000

Dependent Variable: Intercultural communication competence
R=0.487; R²= 0.237; F=51.43

According to the analyses in Table 4, the regression model showing the effect of the independent variables Artificial Intelligence literacy and cultural literacy scale scores, on intercultural communication competence scores is significant ($R=0.487$; $R^2=0.237$; $p<0.05$). Philology students' artificial Intelligence and cultural literacy explain approximately 23.7% of the total variance in their intercultural communication competence scores. When the significance values of the calculated standardized path coefficients are examined, both artificial intelligence literacy and cultural literacy significantly predict intercultural communication competence ($p<0.05$).

Discussion

This study explores the levels of AI literacy, intercultural communication competence, and cultural literacy among philology students. Moreover, it reveals how these variables differ across gender and grade levels while exploring whether AI literacy and cultural literacy significantly predict intercultural communication competence. The findings indicate that AI literacy is high overall and more limited in the usage component. This suggests that students have strong conceptual and ethical awareness but need guidance in the strategizing phase of production with the tool. This pattern is consistent with the findings in the evaluation and ethics components. The overall strength of intercultural communication competence suggests that discourse management, pragmatic propriety, and negotiation strategies are implicitly or explicitly nurtured, resulting in the treatment of ICP as a transdisciplinary core (Kantelinen & Hildén, 2016; Klimova & Chen, 2024). The high level of cultural literacy, particularly the dominant awareness component, suggests an early maturity in representation and ethical sensitivity, paving the way for subcomponents such as interpretative accuracy and reframing.

Findings indicate that CL strengthens in terms of knowledge, interpretation, and representation and provides a suitable starting point for transfer to communicative performance (Lee, 2025). The limited use component suggests the need for a more systematic connection of productive tools to course objectives (Erdem Coşgun, 2025). The positive trend in evaluation and ethics indicators appears to be related to the adoption of open source use, transparent citation, and secondary source verification practices in designs (Pérez-Sánchez et al., 2025).

Research findings suggest that a strong position within the ICP is associated with the adoption of strategies such as critical listening, face-saving, and frame-shifting (Popescu & Iordachescu, 2015; Ali et al., 2022). These strategies have the potential to transform tensions arising in intercultural interactions into learning opportunities. The dominant awareness dimension of CL increases sensitivity to representation, which in turn contributes to communicative appropriateness through narrative reframing (AlAfnan, 2025). However, the differences between disciplines can influence strategy choices, highlighting the need for local adaptations at the departmental level (Liang et al., 2023). Furthermore, contextual factors such

as student attitudes and perceived employability are considered to strengthen the quality of the relationship established with AI. This is consistent with general trends in the literature (Wut et al., 2025).

Thus, awareness and ethical foundations shape the emerging profile. However, structured support is needed for strategic use and performance transfer. When this support is provided, the reflection of assessment indicators on interactive performance becomes easier, and the learning process from text to interaction becomes more consistent (Erdem Coşgun, 2025; Young et al., 2024). Furthermore, the visibility of critical reasoning is increased by adopting micro-level procedures such as multiple output comparison and second-source verification (Pérez-Sánchez et al., 2025). When instructional guidance is strengthened, tool-based production processes operate within a more accountable framework, and this framework solidifies the connection between CL and ICP.

Research results indicate a difference in AI literacy and some sub-dimensions favoring male students, while in the cognitive component of ICP, in particular, favoring female students. This suggests that male students are better in experiential exposure to technology and tool use. In contrast, female students are better in interpretive and communicative sensitivity (Popescu & Iordachescu, 2015). From a CL perspective, the indicators of representation and awareness are more pronounced in female students, and this sensitivity supports interpretive accuracy and ethical approaches (AlAfnan, 2025). However, these differences should not be interpreted causally. Factors such as communal socialization, prior technology experience, and perception of self-efficacy should be considered together (Toker Gokce et al., 2025; Wut et al., 2025; Dalle et al., 2024; Sulasmi & Dalle, 2022).

Findings indicate that combining gender-based strengths can create a quality learning environment. In this context, mixed task designs and peer coaching approaches appear to be effective. The exploitation and evaluation skills highlighted in male students can translate into more responsible production when the principles of evidence chaining and ethical citation are adopted (Young et al., 2024). The interpretive and communicative skills highlighted in female students become more visible and enduring when supported with tasks such as counter-narrative production and adaptation to the audience (Lee, 2025). Layered support mechanisms and paired peer coaching help reduce learning inequalities, while balanced role distribution in online and face-to-face environments reinforces representational justice. Therefore, gender-based learning pathways should be managed by avoiding essentialist approaches and prioritizing flexible designs (Kirmayer, 2012; Liu et al., 2021).

Research also shows that AI literacy, ICP, and CL levels increase with grade level. It has been determined that upper-grade students show more mature performance, particularly in assessment and ethics indicators, and this development is made visible through clear principles and transparent rubrics (Kong et al., 2023). In the cognitive dimension of the ICP, upper-grade students are observed to demonstrate higher proficiency in discourse management and negotiation strategies.

Regarding CL, upper-grade students are able to combine interpretive accuracy and sensitivity to representation with authentic tasks, which accelerate learning transfer (Lee, 2025). The leaps observed in intermediate grades are thought to be related to factors such as task difficulty and multi-perspective integration. Some argue that awareness and ethics are gradually aligned in the early learning period, tool-based production in the middle period, and performance and reflection in the late learning period, strengthening learning continuity (Kong et al., 2023). Interdisciplinary collaborations are seen to intensify in upper grades, and practices of data transparency and source traceability are observed to strengthen ethical reasoning (Pérez-Sánchez et al., 2025). As students' progress through the grade level, the chains of evidence extending from text to interaction become more visible, and assessment quality improves. This progress is achieved through the deliberate integration of educational technologies, resulting in

a more balanced structure. Overall, the findings suggest that the grade level supports a layered learning architecture, and the pedagogical design integrates diverse strengths, providing room for development for both student profiles.

Findings indicate that AI literacy and CL significantly predict ICP. CL appears to have a stronger relationship with ICP, suggesting that elements such as interpretive accuracy and representational sensitivity directly impact communication performance. In contrast, the impact of AI literacy is more indirect, particularly improving strategic decision quality through skills such as establishing a chain of evidence, bias awareness, and source transparency (Young et al., 2024). In this model, CL is considered a fundamental foundation for processing, reframing, and using meaning for communicative purposes, while AI literacy plays a facilitating role supporting this process (Lee, 2025; Long & Lin, 2022). Some have found that CL enhances ICP's pragmatic propriety and negotiation skills, while AI strengthens these skills with an evidence-based and ethical framework (Klimova & Chen, 2024). Therefore, it is vital for instructional design to clearly define CL indicators and ensure that AI-supported tasks produce measurable behaviors associated with these indicators. This approach requires systematic structuring of evaluation criteria (Cormier, 2021).

Literacy should be viewed not only as knowledge but also as an action-oriented competence (AlAfnan, 2025). AI literacy facilitates comparing different perspectives and experimenting with alternative discourse forms, which in turn leads to a richer and more adaptable repertoire of strategies in ICP (Zheng & Stewart, 2024; Lee, 2025). Considering CL and AI components together creates a comprehensive framework explaining ICP, which directly contributes to the design of discipline-specific tasks (Long & Lin, 2022). From an educational policy perspective, CL is considered to be the primary determinant, while AI literacy serves as a supporting element. This recognition shapes instructional priorities and strategies. The incorporation of principles such as evidence presentation, transparent citation, and multiple outcome comparisons in task designs allows for more objective measurement of ICP (Pérez-Sánchez et al., 2025).

Implications of the Findings

Research shows that CL plays a central role in determining ICP, while AI literacy provides complementary support through processes such as building a chain of evidence, developing bias awareness, and ethical attribution (Kirmayer, 2012; Young et al., 2024). Theoretically, a meaning-action continuum emerges between the interpretive and critical dimensions of CL and the pragmatic and interactional outcomes of ICP, providing a solid foundation for task-based approaches (Lee, 2025). At the practical level, CL indicators need to be clearly defined, and AI-supported tasks need to be designed in line with these indicators (Cormier, 2021). Programs typically follow a three-phase structure as awareness and ethics-focused components in the early phase, tool-based production processes in the middle phase, and performance and reflection activities in the late phase. This phasing is consistent with observed development across students' grade levels.

From a policy and practice perspective, incorporating acceptable use, transparent citation, and multiple source verification principles down to the course level reinforces a culture of ethical communication (Perchik et al., 2023; Vráblíková, 2021; Jordan & Lieberman, 2025). Institutional transparency and acceptable use policies should reinforce a culture of ethical communication and increase the visibility of ICP. Bias checklists and short training sessions focused on the chain of evidence for faculty to enhance classroom AI integration. Gender-based differences can be accommodated through peer coaching and layered support mechanisms, contributing to inclusive design. Overall, the responsible integration of CL and AI components strengthens ICP in an evidence-based and measurable way.

Limitations

The findings of this study must be interpreted relative to contextual and methodological limitations, which require a cautious approach to generalizability. The reliance on self-reporting in the data collection process may limit the ability to reflect the full nuances of performance-based evidence (Wang et al., 2023). The limited sample of philology students suggests that variables may exhibit different patterns across disciplines. Due to the nature of the cross-sectional design, claims of causality are unsupported, and correlational interpretations are preferred. Variation in institutional policies and teaching practices influences the patterns observed in some indicators and triggers discussions about external validity. The assumption of semantic equivalence in scale adaptations can be limiting if cross-cultural equivalence tests are not conducted. Inferences regarding gender and class differences are based on indirect indicators and may require additional qualitative evidence.

Recommendations for Future Research

Future studies should use different methods and metrics. Future studies should be conducted with a mixed-methods design and a measurement architecture that balances the scale-task-portfolio trilogy. Longitudinal studies enable the tracking of retention and transfer indicators and align with phased objectives. Gender differences should be integrated across complementary strengths and supported with peer coaching and hybrid tasks. CL's interpretative accuracy and representational sensitivity indicators should be strengthened with functions such as AI-assisted counter-narrative, multiple outcome comparison, and second-source verification.

Conclusion

This study examined the relationships among philology students' AI literacy, intercultural communication competence, and cultural literacy levels. It revealed important findings regarding how these competencies intersect in the context of language education. Descriptive analysis results indicated that philology students generally possessed high levels of AI literacy, but their proficiency in the practical dimension remained moderate. This suggests that students are aware of AI technologies and understand their ethical dimensions but require further development in practical application. Given the increasing use of AI tools in language learning and translation, developing students' practical AI skills should be prioritized in philology curricula. The high levels of intercultural communication competence and cultural literacy observed among the participants are promising and aligned with the fundamental goals of philology education.

Gender-based differences emerged as a striking finding. Male students performed significantly higher in AI literacy, while female students outperformed in intercultural communication competence and cultural literacy. These findings highlight the need for gender-inclusive pedagogical approaches that encourage all students to develop competence equally in all three domains. Consistent increases in AI literacy, intercultural communication competence, and cultural literacy were observed across grade levels, from lower to upper grades. The fact that third- and fourth-grade students performed better on most dimensions demonstrates that philology education effectively develops these competencies over time and the importance of continuous, structured learning experiences. Regression analysis confirmed that both AI literacy and cultural literacy were significant predictors of intercultural communication competence, together explaining approximately 23.7% of the variance. This finding establishes an empirical link between contemporary competencies and traditional philological goals. The

positive relationship between AI literacy and intercultural communication competence indicates that technological competence can increase intercultural interaction capacities.

Funding

This research was funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant No. AP23489843 “Foundations of Artificial Intelligence in Literature: Unveiling Core Mechanisms, Implications, and Future Trajectories”).

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Notes on Contributors

Yertay Sultan, PhD, acting associated professor of the Faculty of Philology at Abai Kazakh National Pedagogical University, Almaty, Republic of Kazakhstan. His scientific field: genre transformation of the modern novel; genre transformation of contemporary journalism; management of higher education and science. Email: yertaysultan@abaiuniversity.edu.kz

Gulnaz Dautova, PhD, acting Associate Professor of the Department of Kazakh Literature and Theory of Literature, Al-Farabi Kazakh National University, Almaty, Republic of Kazakhstan. Her current research interests are Turkic epics, typology, and cultural studies. Email: gulnaz.dautova@kaznu.edu.kz

Juhriyansyah Dalle, Ph.D., serves as an independent researcher and is concurrently engaged as a visiting scholar at Florida Gulf Coast University. His primary research focus pertains to Information Technology and AI in education.

ORCID

Yertay Sultan, <https://orcid.org/0000-0003-3240-2744>

Gulnaz Dautova, <https://orcid.org/0000-0002-3377-5334>

Juhriyansyah Dalle, <https://orcid.org/0000-0002-5700-2766>

Appendix A

Cultural Literacy Scale

1. Learning different languages helps me become culturally literate.
2. Being culturally literate makes it easier to communicate in daily life.
3. Being culturally literate helps me respect different languages.
4. Being with people from different cultures during my undergraduate education improves my cultural literacy.
5. My undergraduate education teaches me about religious differences and how to respect them.
6. Introducing the culture of that language in language teaching makes learning easier.
7. I know the culture of the language I will teach and have the competence to convey it.
8. I can develop materials that include cultural elements that facilitate language learning for students from different cultures.
9. I can develop cultural literacy by engaging students from different cultures in collaborative language teaching.
10. The courses I took during my undergraduate education helped me learn and respect cultural diversity.
11. The courses I took during my undergraduate education helped me learn and respect socioeconomic diversity.
12. I have the knowledge to distinguish the similarities and differences between my culture and other cultures.
13. As a teacher, I have the competence to ensure that my students become culturally literate.
14. As a teacher, I have the competence to ensure that my students respect different cultures.
15. I have learned about my own culture through the undergraduate courses I have taken.
16. I am aware that the education received from my family affects the level of cultural literacy.

Appendix B

Intercultural Communication Competence Scale

Cognitive

1. I feel that people from other cultures have valuable things to teach me.
2. I feel more comfortable around people who are tolerant of other (different) cultures.
3. I generally seek opportunities to interact with people from other cultures.

Emotional

4. I find it easier to classify people by their cultural identity than by their personality (R).
5. I feel more comfortable around people from my own culture than people from other cultures (R).
6. I feel closer to people from my own culture because I relate better to them (R).
7. I often have difficulty distinguishing between similar cultures (e.g., Asians, Europeans, Africans, etc.) (R)