

**Lost in Translation: Evaluating AI Performance in the Kazakh Language and Its
Consequences for Information Access**

Aruzhan Muratbek

Funded by the Summer Undergraduate Research Grant

Northwestern University

August 2026

Lost in Translation: Evaluating AI Performance in the Kazakh Language and Its Consequences for Information Access

1. Introduction

When floods swept through parts of western Kazakhstan in the spring of 2024, people looking for evacuation routes and information about relief payments used whatever tools were within reach. Increasingly, those tools include AI chat assistants. Many of the residents affected speak Kazakh as their first and often their only working language.

Large language models now act as a bridge between people and a great deal of the information they need, and the quality of that layer is not the same for everyone. Kazakh is spoken by roughly fourteen million people and holds official status in Kazakhstan. It is also an agglutinative Turkic language with dense suffixation, and it shares its country with Russian, a co-official language that appears far more often in the text these systems are trained on. That makes Kazakhstan a useful place to test what language support means in practice, because the same user can ask the same question in either language and compare what comes back.

Companies describe language support at the level of the product. A system supports Kazakh or it does not. What that support is worth for a specific task, whether it holds for a question about filing taxes as well as for one about the capital city, is rarely measured, and the people who depend on it are rarely asked.

This study puts them together. It asks: how do major commercial AI language systems perform when prompted in Kazakh compared with Russian, and what are the real-world consequences of their limitations for the information access of Kazakh-dominant speakers? The first half of that question is answered through a controlled benchmark of three commercial systems across six thematic domains, the second through interviews with Kazakh-dominant

speakers about what they do when these tools fail them. Read together, they show how large the gap is and who ends up paying for it.

2. Literature Review

Two bodies of work are relevant to this question: technical research measuring what AI systems do in under-resourced languages, and accountability research on how commercial systems should be audited. Both are useful here, and both stop short of the people whose information access is at stake.

The structural explanation comes from Joshi et al. (2020), who sort the world's languages into six classes by the labelled and unlabelled data available for them. Russian falls into Class 4, "The Underdogs," a group of eighteen languages with substantial resources and no presence problem in NLP. Veitsman (2024) places Kazakh a tier below, in Class 3, "The Rising Stars." The taxonomy predicts that a gap between the two exists. It cannot predict where in a response that gap appears, because it treats resourcedness as a fixed property of a language rather than something that varies by task. The design used here puts that assumption under pressure, since the two languages compared are spoken by the same people, in the same country, about the same subjects, and stand on opposite sides of Joshi's line.

Veitsman and Hartmann (2024) narrow the picture to Central Asia and supply both a linguistic and a political mechanism. Their comparison of Turkic languages shows Kazakh carrying twelve plural suffixes and nine personal verb suffixes against Turkish's two and five, and they identify this agglutinative density as an obstacle specifically in machine translation and named-entity recognition. That is a narrower claim than this study needs, and the distance between the two is informative. Their evidence concerns tasks with a fixed correct output, while the failures reported below appear in open generation, where morphology has more room to go

wrong; the one grammatical error Interviewee 1 named unprompted was confusion of personal endings, the category in which Kazakh carries nearly twice Turkish's inventory. Their own survey points the same way, observing that text generation for Kazakh "remain[s] significantly understudied" and that "only a few experiments have been conducted regarding the usage of large language models for the benefit of Kazakh language." The dimension on which this study finds its largest gap is the one they identify as least examined.

The political mechanism they describe is a supply problem. Russian "remains influential in business, education, and politics," and its media and online resources are "widely accessible in Central Asia, facilitating intercultural communication but limiting the development of NLP for local languages." The result, in their words, is that "heavy reliance on Russian sources for web-scraped data and media results in limited Kazakh, Uzbek, Kyrgyz, and Turkmen content online, restricting data diversity for these languages."

The closest prior measurement is KazMMLU (Togmanov et al., 2025), a 23,000-question benchmark drawn from authentic Kazakhstani educational materials in both languages. GPT-4o performed best in Kazakh at 76.9%, DeepSeek V3 led in Russian at 81.4%, and the authors conclude that models "tend to perform slightly better in Russian than in Kazakh." That word, slightly, is worth pressing on. KazMMLU items are multiple choice, a format that fixes the output and removes generation quality from the measurement, so a system that knows the answer and expresses it in awkward Kazakh scores the same as one that expresses it well. The present study scores open-ended responses on fluency alongside accuracy and finds a much larger gap in exactly the dimension a multiple-choice format cannot see. KazMMLU also draws its subjects from school curricula, while the categories where this study's gap widens most, legal and civic information and politically sensitive topics, fall outside that space.

Mansurova et al. (2025) supply the strongest independent support for the central finding here, though they were not looking for it. Evaluating Kazakh question answering, they found GPT-4o reaching 0.869 answer correctness closed-book against 0.427 for the Kazakh-specific KazLLM-8B, and documented outputs that are "noisy, overly verbose, or exhibit code-switching (inserting non-Kazakh tokens)." Their retrieval experiment matters most. Given ideal context, KazLLM-8B rose to 0.867, essentially matching GPT-4o. If supplying the right facts closes almost the entire gap, the deficit was never mainly about knowledge, which is the conclusion this study reaches from the opposite direction by scoring fluency and accuracy separately on the same responses.

Shen et al. (2024) test cross-lingual safety behavior directly, and their language set positions this study precisely. Russian sits among their nine high-resource languages, with a harmful-response rate of 2% and an instruction-following rate of 99%, which supports its use here as a baseline. Kazakh appears nowhere in a low-resource set running to Hausa, Kamba, Luo, and Maori. Of the two failures they identify, the relevant one is what they call the relevance curse, where GPT-4 "recognizes the instruction and produces relevant responses in only 80% cases with low-resource languages, compared to almost 100% in high-resource languages." The politically sensitive results below are that phenomenon measured differently, with Kazakh scoring 1.90 on handling of sensitive content against 2.90 in Russian because the answers were thinner and more evasive. Their better-known finding, that "35% of the responses to malicious prompts in low-resource languages contain harmful content, compared to 1% in high-resource languages," does not transfer here, since these prompts are legitimate civic questions rather than jailbreak attempts. Shen et al. show that a model asked to do something harmful in a low-

resource language is likelier to comply; this study shows that a model asked something legitimate in a lower-resource language is likelier to say too little.

The accountability strand begins with Buolamwini and Gebru (2018), whose audit of commercial gender classification found error rates as high as 34.7% for darker-skinned women against 0.8% for lighter-skinned men. The contribution was as much methodological as empirical. Their template was to test named commercial products against a structured benchmark, disaggregate the results, and publish. This study borrows that template and adds a phase it did not have, and the addition matters because of how the two technologies reach people. Facial analysis is applied to people whether or not they choose it, so measuring the disparity measures the exposure. A chat assistant is used by people who can walk away, and most participants here had already walked away, so measurement alone captures only what happens to those who stay.

Kornai (2013) supplies the frame participants themselves reached for. Estimating that "less than 5% of all languages can still ascend to the digital realm," he described digital endangerment as loss of function, loss of prestige, and loss of the "ability of raising digital natives in your own language," all of which can precede any fall in speaker numbers. His closest case to Kazakh is Nynorsk, a variety with official recognition, government publication, and a prosperous connected speaker base, where crawling the .no domain still returned 1,620 million words of Bokmål against 26 million of Nynorsk. His verdict was that "the Norwegian population has already voted with their blogs and tweets to take only Bokmål with them to the digital age." Kazakh stands in the same structure, an official language in widespread bilingualism with a thriving alternative, a condition in which he rates the chances of digital survival "rather slim." Kornai names the real issue as "the amount of digitally mediated communication that takes place

in the language," concedes he cannot observe it, and falls back on "the publicly available textual material" as a proxy.

The technical literature measures the systems, the sociolinguistic literature measures the language, and the accountability literature measures the disparity. None of them asks the speakers what the disparity costs them, and for Kazakh nobody has asked at all.

3. Methodology

The study used a two-phase mixed-methods design, carried out in Astana, Kazakhstan, under a protocol approved by the Northwestern University Institutional Review Board (STUDY00010815).

Phase 1: comparative benchmarking. A benchmarking instrument of 60 standardized prompts was built across six thematic categories, with ten prompts in each: general knowledge, translation tasks, historical and cultural references, politically sensitive topics, legal and civic information, and everyday practical queries. Each prompt was written in Kazakh and in Russian, with an English gloss recorded for reference. Russian served as the comparison baseline rather than English because it is co-official in Kazakhstan and available to most of the same users, so comparing the two isolates weaknesses specific to Kazakh from the general limitations of AI systems.

Each of the 120 prompt versions was submitted to three commercial systems, ChatGPT, Gemini, and Claude, producing 360 responses, each recorded verbatim in a structured spreadsheet alongside its prompt, category, language, and system.

Responses were scored on a four-criterion rubric, each criterion on a 1 to 4 scale: factual accuracy, linguistic fluency, cultural appropriateness, and handling of sensitive content. A score of 1 indicated clear factual error, frequent grammatical failure, cultural inappropriateness, or

unsafe and evasive handling; a score of 4 indicated a fully accurate, fluent, culturally appropriate, and balanced response. Factual claims were checked against Kazakhstani sources. The composite score is the mean of the four criteria, and the same written scoring guide was applied to all 360 responses.

Phase 2: semi-structured interviews. The approved protocol allowed for up to fifteen participants. Five interviews were completed and are analyzed here, and participants are identified by number throughout. Interviewee 1 is a secondary-school teacher in a Kazakh-language school in a rural district of Almaty region, in her late fifties. Interviewee 2 is an undergraduate engineering student in Astana in his early twenties. Interviewee 3 is a small-business owner in Astana in her late thirties. Interviewee 4 is a retired journalist and writer in Astana in his mid-sixties. Interviewee 5 is an IT specialist in Astana in his late twenties. All five identified as Kazakh-dominant speakers. Four interviews were conducted in Kazakh and one in Russian, by participant preference. Each ran roughly 45 minutes and followed a five-block guide covering technology use, language choice, experiences with failure, consequences, and broader reflections. Interviews were audio-recorded with written informed consent, transcribed and anonymized, and the recordings deleted after verification.

Analysis. Transcripts were analyzed through inductive thematic coding, with open codes generated for reported failures, coping behaviors, and consequences, then grouped into themes. Benchmark scores were analyzed descriptively, with means calculated by system, language, category, and criterion, and Kazakh-Russian differences computed for each. The two phases were integrated by mapping interview themes onto the benchmark categories, to test whether the domains with the widest measured gaps matched those where participants reported the most

serious consequences. Given the sample size and the qualitative-dominant design, no inferential statistics were used.

4. Results

AI systems scored lower in Kazakh than in Russian on every measure taken. Across all 360 responses, the mean composite score in Kazakh was 3.09 out of 4, against 3.66 in Russian, a gap of 0.57. Every system scored lower in Kazakh, and so did every one of the six thematic categories. Table 1 summarizes the benchmarking results by category, system, and criterion

Table 1

Mean composite scores by category, system, and criterion (1-4 scale, n = 360)

	Kazakh	Russian	Gap
<i>By thematic category</i>			
General knowledge	3.50	3.88	0.38
Translation tasks	3.35	3.88	0.53
Historical and cultural	3.28	3.65	0.38
Politically sensitive	2.39	3.28	0.89
Legal and civic information	2.65	3.45	0.80
Everyday practical	3.35	3.81	0.46
<i>By system</i>			
ChatGPT	3.15	3.61	0.46
Gemini	2.72	3.67	0.95
Claude	3.38	3.69	0.30
<i>By rubric criterion</i>			
Factual accuracy	3.12	3.72	0.60
Linguistic fluency	2.58	3.74	1.16
Cultural appropriateness	3.43	3.79	0.36
Handling of sensitive content	3.21	3.38	0.17
Overall composite	3.09	3.66	0.57

Note. Gap is the Russian mean minus the Kazakh mean, computed from unrounded values, so it may differ by 0.01 from the rounded columns. Category and system cells average 60 responses; criterion cells average 180.

Most of that gap came from how answers were written rather than from what they contained. Of the four criteria, linguistic fluency showed by far the widest difference, at 2.58 in Kazakh against 3.74 in Russian, a gap of 1.16. Factual accuracy followed at 0.60 (3.12 against

3.72), cultural appropriateness at 0.36, and handling of sensitive content at 0.17. Low scores fell the same way: 85 of the 180 Kazakh responses scored 1 or 2 for fluency, compared with 2 of the 180 Russian responses.

Kazakh answers were not shorter or thinner in content. Mean response length was almost identical across languages, at 77.0 characters in Kazakh and 75.8 in Russian, and on general-knowledge prompts factual accuracy was the same in both at 3.93. Several prompts produced answers carrying identical information but different scores. Asked how to replace a national ID card, ChatGPT answered in Kazakh with "ЦОН арқылы ауыстырасыз" and in Russian with "Через ЦОН," both naming the same government service center, and the Russian version scored 3 for fluency against 1 for the Kazakh.

The gap widened essentially in the categories where the stakes were highest. Politically sensitive prompts produced a Kazakh-Russian gap of 0.89 and legal and civic prompts a gap of 0.80, against 0.38 for general knowledge, 0.38 for historical and cultural questions, 0.46 for everyday practical queries, and 0.53 for translation tasks. The Kazakh means for those two categories, 2.39 and 2.65, were the only category means in the study below 3, and all 35 of the Kazakh responses that scored 2.5 or lower overall came from them. The remaining four categories produced none.

Legal and civic prompts produced the widest single gap in the dataset. Fluency in that category averaged 1.90 in Kazakh against 3.83 in Russian, a difference of 1.93 on a four-point scale. Asked how to file a tax declaration, Claude produced substantively matching answers in both languages, naming form 270, the e-Salyq Azamat application, cabinet.salyk.kz, and the September 15 deadline. The Russian answer scored 3.25 and the Kazakh 2.75, with fluency falling from 4 to 3 and factual accuracy from 3 to 2.

Political questions asked in Kazakh drew more evasive answers than the same questions in Russian. Handling of sensitive content scored 1.90 in Kazakh against 2.90 in Russian for politically sensitive prompts, the only category where that criterion differed by language at all. Asked about the January 2022 events, ChatGPT's complete Kazakh answer was "In January 2022 there were protests," scoring 1. Claude's Kazakh answer named the gas price rise and the official death toll of more than 200 and scored 2, against 3 for a Russian answer covering the same ground.

The three systems differed from each other far more in Kazakh than in Russian. Russian composite scores clustered within 0.08, at 3.61 for ChatGPT, 3.67 for Gemini, and 3.69 for Claude. Kazakh scores spread across 0.66, at 2.72 for Gemini, 3.15 for ChatGPT, and 3.38 for Claude. Gemini's Kazakh-Russian gap of 0.95 was more than three times Claude's 0.30. The systems also failed differently: ChatGPT scored highest on factual accuracy in Kazakh at 3.75 but lowest on fluency at 2.42, producing very short and often ungrammatical answers, while Claude reversed that pattern at 3.03 and 3.42.

All five interview participants avoid asking in Kazakh in the first place, and produce Kazakh text by translating Russian output by hand. Interviewee 1 framed the switch as a fear rather than a finding: "I'm afraid that if I write in Kazakh, the answer will not satisfy me." Interviewee 5 described it as a rule: "If I need a quality result, I write in Russian or English right away." Only Interviewee 4 writes in Kazakh on principle, and he switches "reluctantly." The workaround was the same in each case. Interviewee 3 said almost every text her shop publishes is "thought out in Russian, adapted into Kazakh," and that she edits each one twice. Interviewee 1 translated a Nauryz event script herself, calling it "double the work, but the result was more

reliable." Interviewee 2 spent a full night before a deadline repairing a Kazakh coursework introduction, then abandoned it and translated from English.

Participants described the Kazakh output as a failure of register rather than of comprehension. The words they used were "dry," "lifeless," "bookish," "office language," and "bureaucratese." Interviewee 5 asked for a birthday tribute for his father in literary Kazakh and got something that "sounded like a bad official document." Interviewee 3 asked for a warm March 8th flower advertisement and got text addressed formally to "esteemed ladies." Interviewee 2's instructor identified his draft immediately as "machine language." Grammatical failures were reported alongside this, with Interviewee 1 noting verbs left in the infinitive where a conjugated form belongs, confused personal endings, and Russian words appearing inside otherwise Kazakh paragraphs.

The errors participants remembered most clearly were fabrications in cultural and civic material, and every one was caught by the participant's own expertise. Interviewee 4 asked for a poet's words for his memoir and received a quotation the poet never said, which he nearly published under his own name. Interviewee 1 received an invented proverb in a Nauryz script and the wrong year for one of Abai's poems. Interviewee 5 was given a Kazakh name for a government service that does not exist. Interviewee 3 received a tax answer based on a superseded rule and said that had she trusted it she "might have been fined." No participant reported a realized harm.

Each participant then named someone who would not have caught it. Interviewee 1 worried about "a young teacher in a village" passing the error on to children. Interviewee 2 described a classmate from a village who speaks only Kazakh and rewrites every essay several times: "We're the same students, but he works twice as hard." Interviewee 5 asked the

interviewer to imagine "a person from an aul (village) who thinks and speaks only in Kazakh," for whom the technology "wasn't made."

Participants avoid the same domains where the benchmark scores were lowest. All five said they do not trust Kazakh answers on legal, tax, or government matters, and four said they will not ask health questions in Kazakh at all. Interviewee 5 said asking about health in Kazakh is "frightening." None of the five raised political questions as a concern, and none reported asking these systems about Kazakhstani politics in either language.

5. Discussion

The shape of this gap matters more than its size. These systems generally know the answer. The problem in Kazakh is how well they deliver it. When the same substantive content about ID replacement or tax filing scores lower in Kazakh than in Russian, the deficit is in its ability to express that knowledge as usable Kazakh. This explains a pattern in the interviews that would otherwise look strange, where participants describe output as understandable but unusable. The work of turning a technically correct answer into something a client, a student, or a state form will accept falls on the user, and that labor appears in no accuracy score.

Reliability also tends to decrease as the stakes increase. The categories with the smallest gaps are those where a wrong answer costs little. The largest gaps appear where a wrong answer can cost someone money, legal standing, or a returned application. A user who calibrates trust from everyday experience will therefore be most confident where the system is least reliable.

Participants escaped that trap only because of what they brought to it. Interviewee 1 knows Kazakh grammar, Interviewee 4 knows Kazakh literature, Interviewee 3 had an accountant to consult, and Interviewees 2 and 5 read English fluently. All five, unprompted,

named someone without those resources, and located that person outside the city. The sample is drawn from the population least exposed to harm and still reports a consistent cost in time and rework, which makes this study's estimate of that harm a floor rather than a measure.

Preemptive switching also makes the failure hard to see from outside. The benchmark measures what happens when someone asks in Kazakh; the interviews show that experienced users have largely stopped asking in Kazakh. The visible consequence is an absence of Kazakh queries, which in usage data reads as low demand. The damage accumulates instead as unpaid labor and, in the participants' own framing, as withdrawal from the language. Three of the five moved from a technical complaint to a claim about language survival unprompted, with Interviewee 4 calling it a question about the fate of the national language and Interviewee 5 a matter of digital equality.

The system-level variation compounds this. In Russian, the choice of product barely matters. In Kazakh, the same choice moves the score by 0.66, so a Kazakh-speaking user has far more to gain from picking the right system, and far less information with which to pick. Participants used ChatGPT almost exclusively; one had never opened Gemini, one had tried it twice, and one said it "didn't stick." None had compared systems in Kazakh, and with no basis for comparison they read poor output as a fact about their language. Interviewee 4's correction of that assumption, that "our language isn't deficient, the tool is," was the exception. Users who blame the language rather than the vendor generate no pressure to fix it.

Disagreements between the two phases can reveal important differences. Historical and cultural prompts produced only a modest measured gap of 0.38, yet this is where participants reported their most serious failures, including two fabricated cultural artifacts. The likely reason is instrument design. The benchmark asked closed factual questions with verifiable answers,

such as the founding date of the Kazakh Khanate, while participants asked open generative ones, such as writing a Nauryz script or finding a quotation, where fabrication has far more room. The benchmark therefore probably understates the gap for the creative and cultural work people bring to these tools. The reverse holds for politically sensitive prompts, the widest measured gap in the study, which no participant raised at all.

Several limitations bear on how far these results travel. All 360 responses were scored by a single rater who also designed the prompts, with no second coder and no reliability check, so the scores carry the researcher's judgment. Five interviews cannot represent Kazakh-dominant speakers generally, and four of the five live in Astana. Each prompt was submitted once, which cannot capture the instability Interviewee 4 described when a repeated question produced two different years.

6. Conclusion

The question this study intended to answer was whether major commercial AI systems perform worse in Kazakh than in Russian, and what that costs the people who speak Kazakh.

The answer to the first part is yes, by 0.57 points on a four-point scale, consistently across three systems and six domains. The gap is in linguistic fluency rather than factual knowledge, so these systems largely have the information and fail to render it in acceptable Kazakh. It widens to 0.89 for politically sensitive material and 0.80 for legal and civic information, the two domains where being wrong is most expensive, and it varies enormously by product in Kazakh while barely varying at all in Russian.

The answer to the second part is that the cost is mostly paid in labor instead of misinformation. Kazakh-dominant speakers who can switch languages do, then translate back by hand, doing twice the job a Russian speaker does once. Those who cannot switch are exposed to

fabricated proverbs, invented government terminology, and superseded tax rules in the domains where error is costliest. Participants caught those errors because they had professional expertise and a second language.

That gap between who was interviewed and who is most at risk is the clearest direction for further work. The claim that a system supports Kazakh works when you ask about the capital city or how to cook plov. It does not work for a tax declaration. Looking at language support at the product level, instead of at the task level, hides this difference. And the people most affected by these gaps are often the least able to report them.

References

- Buolamwini, J., & Gebru, T. (2018). Gender shades: Intersectional accuracy disparities in commercial gender classification. *Proceedings of Machine Learning Research*, 81, 77–91.
- Joshi, P., Santy, S., Budhiraja, A., Bali, K., & Choudhury, M. (2020). The state and fate of linguistic diversity and inclusion in the NLP world. *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, 6282–6293.
- Kornai, A. (2013). Digital language death. *PLOS ONE*, 8(10), e77056.
- Mansurova, A., Tleubayeva, A., Nugumanova, A., Shomanov, A., & Seker, S. E. (2025). A systematic evaluation of large language models and retrieval-augmented generation for the task of Kazakh question answering. *Information*, 16(11), 943.
- Shen, L., Tan, W., Chen, S., Chen, Y., Zhang, J., Xu, H., Zheng, B., Koehn, P., & Khashabi, D. (2024). The language barrier: Dissecting safety challenges of LLMs in multilingual contexts. *Findings of the Association for Computational Linguistics: ACL 2024*, 2668–2680.
- Togmanov, M., Mukhituly, N., Turmakhan, D., Mansurov, J., Goloburda, M., Sakip, A., Xie, Z., Wang, Y., Syzdykov, B., Laiyk, N., Aji, A. F., Kochmar, E., Nakov, P., & Koto, F. (2025). KazMMLU: Evaluating language models on Kazakh, Russian, and regional knowledge of Kazakhstan. *Proceedings of the 63rd Annual Meeting of the Association for Computational Linguistics*, 14403–14416.
- Veitsman, Y., Hartmann, M. (2024). Recent advancements and challenges of Turkic Central Asian language processing. *arXiv*.

Appendix A. Semi-Structured Interview Guide

Questions were translated into Kazakh or Russian and asked in the participant's preferred language.

Block 1 — Background and technology use

- How often do you use the internet for finding information in your daily life?
- Which tools or platforms do you typically use when you need to look something up?
- Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

Block 2 — Language and AI

- When you use AI tools, which language do you typically use — Kazakh, Russian, or another?
- Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?
- Do you ever switch to Russian because you feel it gives better results? Describe a situation.
- Have you noticed differences in how well AI responds depending on which language you use?

Block 3 — Experiences with failure

- Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?
- When that happened, what did you do next?
- Have you ever received information from an AI in Kazakh that you later found out was incorrect?

Block 4 — Consequences

- Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?
- Has an AI's failure in Kazakh ever had a real consequence for you?
- Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Block 5 — Broader reflections

- How important do you think it is for AI tools to work well in Kazakh?
- Is there anything else about your experience you think is important to share?

Appendix B. Interview Transcripts

Transcripts are reproduced in the language of the interview followed by an English translation. Names and identifying details have been removed; participants are identified by number only.

Interviewee 1

Interview language: Kazakh. Profile: Secondary-school teacher, works in a Kazakh-language school in a rural district of Almaty region; late 50s; Kazakh-dominant, moderate tech user.

— Original transcript —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Күн сайын дерлік қолданамын ғой. Мектепте сабаққа дайындалғанда, бір мәліметті тексергенде бірден телефонға жүгінемін. Бұрын кітапханаға барушы едім, қазір бәрі қолыңның астында.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

Көбіне Google-ды ашамын. Кейде YouTube-тан бейне сабақтар іздеймін, әсіресе физика-химияны түсіндіргенде балаларға көрсету үшін. Соңғы бір жылда ChatGPT-ні де қоса бастадым.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

Иә, ChatGPT-ні қолданамын. Күнде емес, аптасына үш-төрт рет шығар. Көбіне сабақ жоспарын құрастырғанда немесе тапсырма ойлап табу керек болғанда. Gemini дегенді естігенмін, бірақ оны ашып көрген жоқпын.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

Рас керек десем, орысша жазамын. Өзім қазақ мектебінде істесем де, машинаға орысша сұрақ қойған әдетке айналып кеткен. Қазақша жазсам, жауабы көңілімнен шықпайды деп қорқам.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

Байқап көрдім ғой. Наурыз туралы сыныптан тыс шара өткізетін болып, қазақша сценарий сұрап едім. Жауабы әдемі басталды, бірақ ортасында бір-екі сөйлем мүлдем бөлек тақырыпқа ауып кетті. Оқып отырсам, мақал деп берген нәрсесі жоқ мақал, өзі ойлап тапқан сияқты. Балаларға ондай нәрсені бере алмаймын ғой.

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Иә, дәл солай істеймін. Өлгі Наурыз сценарийінен кейін орысшаға көштім. Орысша сұрағанда мәтін ұйқасып, ретімен шықты. Содан оны өзім қазақшаға аударып алдым. Айналып келгенде екі есе жұмыс болды, бірақ нәтижесі сенімдірек.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

Айырмашылық жер мен көктей. Орысша жауап бай, толық. Қазақшасы құрғақ, кейде грамматикасы қате. 'Барады' дейтін жерде 'бару' деп қалдырады, жіктік жалғауын шатастырады. Оқыған адам бірден сезеді.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

Дәл сол сценарий оқиғасы есімде. Бір абзацтың ішінде қазақ сөздерінің арасына 'традиция', 'символизирует' деген орыс сөздері кіріп кеткен. Немене, өзі шала қазақ па деп күлдім. Түсінікті, бірақ дұрыс емес.

Q3.2: When that happened, what did you do next?

Әуелі қайта жаздырып көрдім, 'таза қазақ тілінде жаз' деп. Сәл түзелді, бірақ толық болмады. Ақыры орысша нұсқасын алып, өзім қолмен аудардым. Мұғалім болған соң тіл маған оңай ғой, бірақ басқа адам болса қиналар еді.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

Болған. Абайдың бір өлеңінің шыққан жылын сұрап едім, қате жыл берді. Жақсы, өзім білетін тақырып болғандықтан байқадым. Білмейтін нәрсе болса, сеніп кете беруім мүмкін ғой. Соны ойласам, қорқам.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

Тарих пен әдебиетте қателік көп. Ақындардың өмірбаяны, оқиға жылдары жиі шатасады. Заң, құжат жағын қазақша сұрап көрген жоқпын, бірақ соған да сенбеймін. Мемлекеттік сайттардың өзі шала қазақша болғанда, машинадан не сұрарсың.

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

Үлкен зиян шеккен жоқпын, өйткені мұғалім болған соң қатесін көріп отырам. Бірақ уақытым кетеді. Бір сағаттық жұмысты екі сағатқа созам, тексеріп, түзетіп. Ауылдағы жас мұғалім сол қатені байқамай, балаларға сол күйі беруі мүмкін ғой. Мені алаңдататыны сол.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Әрине, кемшін жағдайдамыз. Орысша сөйлейтін адам бәрін бірден, дұрыс алады. Біз, қазақша жұмыс істейтіндер, әлі сол ескі әдіспен, қолмен түзетіп отырамыз. Тіліміз бар, бірақ құрал жоқ сияқты.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

Өте маңызды. Біз балаларды қазақша оқытамыз, ертең олар осы құралдарды қолданады. Егер машина қазақшаны місе тұтпаса, бала да тілге салғырт қарайды. Тіл тек мектепте емес, технологияда да тірі болуы керек.

Q5.2: Is there anything else about your experience you think is important to share?

Айтарым — асықпасын деймін жасаушыларға. Тез жасаймын деп шала жасағанша, баппен, тілді білетін адамдармен жасаса екен. Біздің тіл бай, оны шала көрсету обал.

— English translation —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Almost every day. When I prepare for lessons or need to check a fact, I reach for my phone right away. I used to go to the library; now everything is at your fingertips.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

Mostly I open Google. Sometimes I look for video lessons on YouTube, especially to show the children when I'm explaining physics or chemistry. In the last year I've started using ChatGPT too.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

Yes, I use ChatGPT. Not daily — maybe three or four times a week. Usually when I'm building a lesson plan or need to come up with an exercise. I've heard of Gemini but I've never opened it.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

If I'm honest, I write in Russian. Even though I work in a Kazakh-language school, I've fallen into the habit of asking the machine in Russian. I'm afraid that if I write in Kazakh, the answer won't satisfy me.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

I did try. We were organizing an extracurricular Nauryz event and I asked for a script in Kazakh. It started off nicely, but in the middle a sentence or two drifted off onto a completely different topic. And when I read it, the thing it gave as a proverb seemed to have invented it. I can't give children something like that.

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Yes, that's exactly what I do. After that Nauryz script I switched to Russian. When I asked in Russian, the text rhymed and came out in proper order. Then I translated it into Kazakh myself. In the end it was double the work, but the result was more reliable.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

The difference is like heaven and earth. The Russian answer is rich and complete. The Kazakh one is dry, and sometimes the grammar is wrong. Where it should say 'barady' it leaves 'baru,' it mixes up the personal endings. Anyone educated notices immediately.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

That same script is what I remember. Within one paragraph, Russian words like 'traditsiya' and 'simvoliziruyet' crept in among the Kazakh. I laughed — is it half-Kazakh itself? It was understandable, but not correct.

Q3.2: When that happened, what did you do next?

First I had it rewrite, telling it 'write in pure Kazakh.' It improved slightly but not fully. In the end I took the Russian version and translated it by hand. Being a teacher, language is easy for me, but someone else would have struggled.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

It has. I asked for the year one of Abai's poems was written, and it gave the wrong year. Luckily it was a topic I know, so I caught it. If it were something I didn't know, I might just trust it. That thought frightens me.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

There are many errors in history and literature. Poets' biographies, the dates of events, it often confuses them. I haven't tried asking about legal or document matters in Kazakh, but I wouldn't trust that either. When even the government websites are in broken Kazakh, what can you expect from the machine?

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

I haven't suffered any great harm, because as a teacher I see the mistakes. But it costs me time. I stretch an hour's work into two, checking and correcting. A young teacher in a village might not notice the error and hand it to the children as is. That's what worries me.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Of course we're at a disadvantage. A Russian-speaking person gets everything at once, correctly. We, the ones who work in Kazakh, still correct everything by hand, the old way. We have our language, but it's as if there's no tool for it.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

Very important. We teach children in Kazakh, and tomorrow they'll use these tools. If the machine treats Kazakh as second-rate, the child will grow careless about the language too. A language has to be alive not only in school but in technology.

Q5.2: Is there anything else about your experience you think is important to share?

What I'd say is — I'd tell the developers not to rush. Rather than doing it badly in a hurry, they should do it carefully, with people who know the language. Our language is rich; it's a shame to present it as something lesser.

Interviewee 2

Interview language: Kazakh. Profile: Undergraduate engineering student in Astana; early 20s; Kazakh-dominant at home but studies in English/Russian; heavy AI user.

— Original transcript —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Үнемі. Оянған сәттен бастап телефон қолымда. Сабаққа, жаңалыққа, тіпті қай жерде жақсы кофе бар дегенге дейін бәрін іздеп отырам. Күніне жүз рет десем де өтірік емес.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

Google, әрине. Оқуға қатысты болса — ChatGPT. Дереккөз керек болса Google Scholar. Инстаграм мен Telegram-нан да жаңалық оқимын, бірақ ол бөлек әңгіме.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

ChatGPT-ні күнде қолданам, шыны керек. Оқу, код жазу, эссе құрылымын ойлау — бәрінде. Gemini-ді бір-екі рет сынап көрдім, Claude-ты да естігенмін, бірақ негізгі құралым ChatGPT.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

Ағылшынша. Техникалық мамандық болған соң, терминдер ағылшынша оңай. Кейде орысша. Қазақша... сирек, тек қазақ тіліне қатысты бірдеңе керек болғанда ғана.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

Иә. Курстық жұмысымның кіріспесін қазақша жазу керек болды. ChatGPT-ге қазақша жаздырып көрдім. Сөйлемдері грамматикалық жағынан дұрыс сияқты, бірақ мүлдем жансыз, кітаби. Ешбір қазақ адам олай сөйлемейді. Оқытушым бірден 'бұл машинаның тілі ғой' деп таныды.

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Тұрақты түрде. Қазақша жаздырсам, оны кейін орысшаға аударып, қайта салыстырам, себебі қазақшасына сенбеймін. Бір жолы диплом тақырыбымды қазақша тұжырымдап беруін сұрадым — берген нұсқасы соншалық ебедейсіз болды, ақыры орысша сұрап, өзім аудардым.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

Айқын айырмашылық бар. Ағылшынша сұрасам — терең, нақты, мысалдары көп. Орысша да жақсы. Қазақша сұрасам, жауабы қысқа әрі үстірт. Кейде сөздің ортасынан ағылшын әрпі шығып қалады, 'кернейді' дейтін жерде әріптері шатасып кетеді.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

Болды. Бір техникалық ұғымды — 'жүктеме' дегенді — қазақша түсіндір дегенде, ол оны сөзбе-сөз аударып, мүлдем басқа мағына берді. 'Нагрузка' мен 'загрузка' екеуін шатастырған сияқты. Инженер адам үшін бұл өрескел қате.

Q3.2: When that happened, what did you do next?

Бірден ағылшыншаға көштім. Сол сұрақты ағылшынша қойдым, дұрыс жауап берді. Қазақшамен уақыт кетіргенше, әдетте бірден ағылшынша не орысша жазам. Әдетке айналып кетті.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

Иә, бірнеше рет. Бір заңдық терминнің қазақша баламасын дұрыс емес берді. Кейін оқытушыдан сұрағанда, мүлдем басқа сөз екен. Сол кезден бастап қазақша берген терминдерін әрдайым тексеретін болдым.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

Техникалық және ғылыми терминдерде сенбеймін. Заң, ресми құжат тілінде де солай. Жаңалық жағын айтпаса да болады — қазақша жаңалықты дұрыс жинақтай

алмайды, кейде оқиғаларды араластырып жібереді. Ал денсаулық жөнінде қазақша сұрауға қорқам, қате кеңес берсе қайтем.

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

Курстық жұмыс кезінде уақытымды көп алды. Қазақша нұсқаны түзетемін деп бір түн отырдым. Дедлайн қыл үстінде тұрды. Ақыры ағылшыншадан аударып тапсырдым. Салдары — ұйқысыз түн және керексіз стресс.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Сөзсіз. Мен ағылшын білем, сондықтан құтылып жүрмін. Ал ауылдан келген, тек қазақша білетін курстасым бар — ол әр эссені әлденеше рет қайта жаздырып, әуре болады. Бірдей студентпіз, бірақ ол екі есе көп еңбектенеді. Әділетсіздік деп осыны айтады.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

Маңызды, әрине. Бірақ шынымды айтсам, көп адам менің жасымда ағылшынша не орысшаға көшіп кеткен. Егер қазақша жақсы жұмыс істемесе, біз тілден алыстай береміз. Сол себепті бұл тек ыңғайлылық емес, тілдің болашағы туралы мәселе.

Q5.2: Is there anything else about your experience you think is important to share?

Мынаны айтқым келеді: мәселе тек грамматика емес. Машина қазақтың ойлау мәнерін, сөйлеу ырғағын білмейді. Дұрыс сөйлем құрса да, ол 'тірі' емес. Соны түзету қиынырақ шығар деп ойлаймын.

— English translation —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Constantly. From the moment I wake up my phone is in my hand. Lectures, news, even where there's good coffee — I look up everything. It wouldn't be a lie to say a hundred times a day.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

Google, of course. If it's about studies — ChatGPT. If I need a source, Google Scholar. I also read news from Instagram and Telegram, but that's a separate matter.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

I use ChatGPT every day, honestly. Studying, writing code, thinking through essay structure — all of it. I tried Gemini once or twice, I've heard of Claude too, but my main tool is ChatGPT.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

In English. Since I'm in a technical field, the terms are easier in English. Sometimes Russian. Kazakh... rarely, only when I need something specifically related to the Kazakh language.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

Yes. I had to write the introduction to my coursework in Kazakh. I tried having ChatGPT write it in Kazakh. The sentences seemed grammatically fine, but they were completely lifeless,

bookish. No Kazakh person actually talks like that. My instructor recognized it instantly - 'this is machine language.'

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Constantly. If I have it write in Kazakh, I then translate it into Russian and compare, because I don't trust the Kazakh. Once I asked it to formulate my thesis topic in Kazakh - the version it gave was so clumsy that I ended up asking in Russian and translating it myself.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

There's a clear difference. If I ask in English - it's deep, precise, with lots of examples. Russian is good too. If I ask in Kazakh, the answer is short and superficial. Sometimes an English letter pops up in the middle of a word; where it should say 'kerneidi' the letters get jumbled.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

Yes. When I asked it to explain a technical concept — 'load' — in Kazakh, it translated it literally and gave a completely different meaning. It seemed to confuse 'nagruzka' (load) with 'zagruzka' (download). For an engineer that's a gross error.

Q3.2: When that happened, what did you do next?

I switched to English right away. I asked the same question in English and it answered correctly. Rather than waste time with Kazakh, I usually just write in English or Russian from the start. It's become a habit.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

Yes, several times. It gave the wrong Kazakh equivalent of a legal term. Later, when I asked my instructor, it turned out to be a completely different word. Since then I always double-check the Kazakh terms it gives.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

I don't trust it with technical and scientific terms. Same with legal and official document language. News too - it can't summarize Kazakh news correctly, sometimes it mixes up events. And I'm afraid to ask about health in Kazakh; what if it gives wrong advice?

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

During my coursework it took a lot of my time. I sat up one whole night trying to fix the Kazakh version. The deadline was right on the edge. In the end I translated from English and submitted that. The consequence - a sleepless night and needless stress.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Without a doubt. I know English, so I get by. But I have a classmate from a village who only knows Kazakh - he struggles, rewriting every essay several times. We're the same students, but he works twice as hard. That's what you call injustice.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

Important, of course. But honestly, many people my age have already switched to English or Russian. If Kazakh doesn't work well, we'll keep drifting away from the language.

Q5.2: Is there anything else about your experience you think is important to share?

I want to say this: the problem isn't only grammar. The machine doesn't know the Kazakh way of thinking, the rhythm of speech. Even when it builds a correct sentence, it isn't 'alive.' I think that will be harder to fix.

Interviewee 3

Interview language: Kazakh. Profile: Small-business owner in Astana; late 30s; Kazakh-dominant, uses AI for marketing and bookkeeping.

— Original transcript —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Жұмысыма байланысты күнде. Гүл бизнесі болған соң, жеткізушілерді, бағаны, мерекелерді тексеріп отырам. Бухгалтерияны да өзім жүргіземін, сондықтан салық, есеп жағын да жиі іздеймін.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

Негізі Google, 2GIS. Салыққа қатысты болса — egov, salyk сайттары. Былтырдан бері ChatGPT-ні қостым, әсіресе жарнама мәтінін, посттарды жазуға.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

Иә, ChatGPT. Аптасына бірнеше рет. Instagram-ға пост жазғызам, мереке құттықтауларын ойлатам, кейде клиентке жауап хатын жаздырам. Ыңғайлы, уақыт үнемдейді.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

Қазақша да, орысша да. Клиенттерім екі тілде болғандықтан, екеуін де қолданам. Бірақ маңызды мәтін болса, орысша жаздырып, кейін қазақшаға аударам.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

8 наурызға арнап қазақша жарнама мәтінін жаздырдым. Нәтижесі — сөзі жаттанды, 'құрметті ханымдар' деп басталатын кеңсе тіліндей. Гүл дүкеніне жылы, жүрекке жақын мәтін керек қой. Ол берген нәрсе суық, ресми еді. Клиент ондайды оқып жатпайды.

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Иә, жиі. Дәл сол 8 наурыз мәтінін орысша жаздырғанда, әлдеқайда жылы, сезімді шықты. 'Весна, нежность, любовь' деген сияқты. Оны қазақшаға аударғанда да табиғи болды. Сондықтан әдетте орысша бастаймын.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

Бар, әрине. Орысшасы шығармашыл, эмоциясы бар. Қазақшасы құрғақ, кеңсе тіліне ұқсайды. Маркетингте эмоция маңызды ғой, ал машина қазақша эмоцияны жеткізе алмайды сияқты.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

Бір жолы букет атауларын қазақша ойлап беруін сұрадым. Берген атаулары бірі — түсініксіз, бірі — күлкілі еді. 'Нәзік таңғы шық' дегенді 'Әлсіз ерте тамшы' деп аударған сияқты. Сөзбе-сөз, жансыз. Клиентке ондай атауды көрсете алмайсың.

Q3.2: When that happened, what did you do next?

Орысшаға көштім, сосын өзім қазақшалап, аздап өңдедім. Дүкеннің барлық мәтіні дерлік осылай жасалады — орысша ойлап, қазақшаға бейімдеп. Қосымша жұмыс, бірақ амал жоқ.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

Салыққа қатысты бірдеңе сұрап едім, қазақша берген жауабы ескі ереже бойынша болып шықты. Бухгалтерге көрсеткенде, 'бұл заң өзгерген' деді. Жаксы, ақша жұмсамай тұрып тексердім. Әйтпесе қате есеппен айыппұл жеуім мүмкін еді.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

Салық, заң, ресми құжат — осы жерде мүлдем сенбеймін. Заң жиі өзгереді, ал машина ескі мәліметпен жауап береді, оның үстіне қазақшасы шатысады. Денсаулық жағын да сұрамаймын. Жаңалықты да тексеріп отырам.

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

Жаңа айтқан салық жағдайы дәл сондай еді. Егер сеніп қалсам, декларацияны қате толтырар едім, айыппұл болуы мүмкін. Уақытымды да алады — әр мәтінді екі рет өңдеймін. Кіші бизнеске уақыт деген ақша ғой.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Әрине. Орыс тілінде бизнес жүргізетін адам бәрін дайын, жылдам алады. Мен қазақша контент жасаймын деп, әр нәрсені қолмен түзетемін. Қазақ клиентке қазақша қызмет көрсеткім келеді, бірақ құрал маған көмектеспейді, кедергі болады.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

Маған өте маңызды. Мен қазақ тілінде бренд жасағым келеді, бұл менің құндылығым. Егер бұл құралдар қазақшаны жақсы білсе, менің жұмысым жеңілдейді, көбірек адамға қазақша жетер едім. Қазір тіл үшін қосымша күш жұмсаймын.

Q5.2: Is there anything else about your experience you think is important to share?

Мынаны қосар едім: біз, кәсіпкерлер, қазақ тілін тірі ұстауға тырысамыз, посттарымызбен, жарнамамызбен. Бірақ құрал бізге қарсы жұмыс істегендей. Соны түзетсе, тіл де, бизнес те ұтар еді.

— English translation —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Every day, because of my work. Since it's a flower business, I check suppliers, prices, holidays. I do the bookkeeping myself, so I often look up tax and accounting things too.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

Mainly Google and 2GIS. For tax matters — the egov and salyk sites. Since last year I've added ChatGPT, especially for writing ad copy and posts.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

Yes, ChatGPT. A few times a week. I have it write Instagram posts, come up with holiday greetings, sometimes draft a reply to a client. It's convenient, it saves time.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

Both Kazakh and Russian. Since my clients are in both languages, I use both. But if it's an important text, I have it written in Russian and then translate it into Kazakh.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

I had it write an ad for March 8th in Kazakh. The result — the wording was stiff, like office language starting with 'esteemed ladies.' A flower shop needs warm, heartfelt text. What it gave was cold and formal. A client won't read something like that.

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Yes, often. When I had that same March 8th text written in Russian, it came out far warmer, with feeling. Things like 'spring, tenderness, love.' And when I translated it into Kazakh it was natural too. So I usually start in Russian.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

There is, of course. The Russian is creative, it has emotion. The Kazakh is dry, like office language. In marketing emotion matters, and the machine doesn't seem able to convey emotion in Kazakh.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

Once I asked it to come up with bouquet names in Kazakh. The names it gave — some were incomprehensible, some were funny. It seemed to translate 'delicate morning dew' as 'weak early drop.' Word-for-word, lifeless. You can't show a client a name like that.

Q3.2: When that happened, what did you do next?

I switched to Russian, then made it Kazakh myself and edited it a little. Almost all the shop's text is made this way — thought out in Russian, adapted into Kazakh. Extra work, but there's no way around it.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

I asked something about tax, and the Kazakh answer turned out to be based on an old rule. When I showed my accountant, she said 'that law has changed.' Luckily I checked before spending money. Otherwise I could have been fined over a wrong calculation.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

Tax, law, official documents — that's where I trust it least of all. Laws change often, and the machine answers with old information, and on top of that the Kazakh gets muddled. I don't ask about health either. I double-check news too.

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

The tax situation I just mentioned was exactly that. If I had trusted it, I'd have filled out the declaration wrong and might have been fined. It also takes my time — I edit every text twice. For a small business, time is money.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Of course. A person doing business in Russian gets everything ready-made, fast. I, trying to make Kazakh content, correct everything by hand. I want to serve Kazakh clients in Kazakh, but the tool doesn't help me — it gets in the way.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

Very important to me. I want to build a brand in Kazakh; that's my value. If these tools knew Kazakh well, my work would be easier and I could reach more people in Kazakh. Right now I spend extra effort for the language.

Q5.2: Is there anything else about your experience you think is important to share?

I'd add this: we entrepreneurs try to keep the Kazakh language alive, with our posts, our ads. But the tool seems to work against us. If they fixed that, both the language and business would win.

Interviewee 4

Interview language: Kazakh. Profile: Retired journalist and writer in Astana; mid-60s; Kazakh-dominant, cautious but daily AI user.

— Original transcript —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Жасыма қарамай, күнде қолданам. Өмір бойы жазумен айналысқан адаммын, ізденіс — әдетім. Мақала жазам, естеліктерімді ретке келтіріп жүрмін, сондықтан дерек тексеру күнделікті ісім.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

Google, әрине. Электронды кітапханаларды ашам. Балаларым ChatGPT деген барын үйретті, содан бері оны да қолданып көрем, бірақ сақтықпен.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

Иә, ChatGPT-мен таныспын. Жиі емес, бірақ бір деректі жылдам еске түсіру керек болса қолданам. Оны толық сенімді дос деп есептемеймін, көбіне ой қозғау үшін ғана.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

Қазақша жазам. Мен үшін бұл принцип. Өмір бойы қазақ тілінде жазып келдім, машинамен де қазақша сөйлескім келеді. Бірақ жауабына көңілім толмайды, шынымды айтсам.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

Естелігіме бір ақынның сөзін дәйексөз ретінде келтірмек болып, соны қазақша сұрадым. Машина маған әдемі дәйексөз берді — бірақ ол дәйексөзді ол ақын ешқашан айтпаған. Мүлдем ойдан шығарылған. Жазушы ретінде мұндай нәрсе — қылмыс. Жалған дерек жариялап қоя жаздадым.

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Амалсыздан кейде көшем. Бірақ жүрегім қаламайды. Бір рет мақаламның тақырыбын жатық қазақша ұсын дедім, берген нұсқалары солғын еді. Орысша сұрап көрдім, идеясы жақсырақ болды, оны қазақшалап алдым. Қартайғанда орысша ойлауға мәжбүр болғаным — өкінішті.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

Айырмашылық анық. Орысшасы мазмұнды, орамды. Қазақшасы — сүреңсіз, жасанды. Тілдің майын, иірімін білмейді. Біздің тіл образды ғой, ал машина сол образды жоғалтады, тек құр сүлдесін береді.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

Әлгі жалған дәйексөз — ең есте қаларлық оқиға. Одан бөлек, бір тарихи оқиғаның жылын сұрағанда, екі түрлі жауап берді — алдымен бір жыл, қайта сұрағанда басқа жыл. Өзі де білмейді, бірақ сенімді түрде айтады. Ең қауіптісі сол.

Q3.2: When that happened, what did you do next?

Дереккөзге, ескі кітаптарыма жүгіндім. Мен ескі мектептің адамымын, машинаға толық сенбеймін. Әрдайым қолмен тексерем. Жастар тексермей алып, сеніп кетеді — қауіпі сонда.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

Иә, дәл сол дәйексөз бен жыл шатасуы. Егер тексермегенде, менің атыммен жалған дерек жарық көрер еді. Абыройыма нұқсан келер еді. Сондықтан машинаны — көмекші, бірақ жауапкершілік менде деп ұғам.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

Әдебиет, тарих, дәйексөз — осында өте абай болу керек. Машина қазақ әдебиетін таяз біледі. Ақын-жазушылардың сөздерін бұрмалайды, шығармаларды шатастырады. Заң, медицина жағын сұрамаймын да, оған тіпті сенбеймін.

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

Ол жалған дәйексөз оқиғасы — нақты салдар болатын еді. Абыройым, кәсіби беделім — бәрі қатерге түсер еді. Жазушы үшін жалған дерек — ең үлкен қате. Машина соған итермеледі. Жақсы, тәжірибем сақтап қалды.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Сөзсіз, кемсітушілік бар. Біз, қазақ тілінде жазатын буын, әрдайым артық еңбек етеміз. Орыс тілінде жазатын әріптесім бәрін дайын алады. Тіліміз кемшін емес, құрал кемшін. Соны айыра білу керек.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

Аса маңызды. Бұл — ұлт тілінің тағдыры туралы мәселе. Егер қазақ тілі технологияда лайықты орын алмаса, келер ұрпақ тілден жырақтайды. Тіл музейге айналмауы керек, ол тірі, заманауи болуы шарт. Ол үшін мұндай құралдар қазақшаны місе тұтпауы керек.

Q5.2: Is there anything else about your experience you think is important to share?

Соңында айтарым: жасаушылар қазақ тілін жай ғана 'аударып' қоймасын. Тілдің жаны бар, тарихы бар. Оны білетін ақын, жазушы, тілшілермен ақылдассын. Әйтпесе тіліміздің көркін кетіреді. Мен мұны ұлт ретінде маңызды деп санаймын.

— English translation —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Despite my age, I use it every day. I've been a writer all my life, so searching is a habit. I write articles, I'm putting my memoirs in order, so checking facts is my daily task.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

Google, of course. I open digital libraries. My children taught me that ChatGPT exists, and since then I've tried using it too, but with caution.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

Yes, I'm familiar with ChatGPT. Not often, but I use it when I need to quickly recall a fact. I don't consider it a fully trustworthy friend, mostly just something to stir my thinking.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

I write in Kazakh. For me it's a principle. I've written in Kazakh all my life, and I want to speak Kazakh with the machine too. But the answers don't satisfy me, if I'm honest.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

For my memoir I wanted to quote a poet's words, so I asked in Kazakh. The machine gave me a beautiful quotation — but that poet never said it. It was completely invented. For a writer, such a thing is a crime. I nearly published a false fact.

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Reluctantly, I sometimes switch. But my heart isn't in it. Once I asked it to suggest a fluent Kazakh title for my article, and the versions it gave were pale. I tried in Russian, the idea was better, and I put it into Kazakh myself. Being forced to think in Russian in my old age — that's regrettable.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

The difference is clear. The Russian is substantial, eloquent. The Kazakh is dull, artificial. It doesn't know the essence, the nuance of the language. Our language is figurative, and the machine loses that imagery, giving only a hollow husk.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

That false quotation is the most memorable. Apart from that, when I asked for the year of a historical event, it gave two different answers — first one year, and when I asked again, another. It doesn't know itself, but it says it confidently. That's the most dangerous part.

Q3.2: When that happened, what did you do next?

I turned to sources, to my old books. I'm a person of the old school; I don't fully trust the machine. I always check by hand. Young people take it without checking and trust it — that's the danger.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

Yes, that very quotation and the confusion of years. If I hadn't checked, a false fact would have been published under my name. It would have damaged my reputation. So I understand the machine as a helper, but the responsibility is mine.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

Literature, history, quotations — one must be very careful there. The machine knows Kazakh literature shallowly. It distorts writers' words, confuses their works. I don't even ask about legal or medical matters; I don't trust it at all there.

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

That false-quotation episode would have had a real consequence. My reputation, my professional standing — all of it would have been at risk. For a writer, a false fact is the greatest error. The machine pushed me toward it. Fortunately, my experience saved me.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Undoubtedly, there is discrimination. We, the generation that writes in Kazakh, always do extra work. My colleague who writes in Russian gets everything ready-made. Our language isn't deficient — the tool is. One must be able to tell the difference.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

Extremely important. This is a question about the fate of the nation's language. If the Kazakh language doesn't take its rightful place in technology, the coming generation will drift away from it. A language must not become a museum piece; it must be living and modern. For that, such tools must not treat Kazakh as second-rate.

Q5.2: Is there anything else about your experience you think is important to share?

What I'd say finally: let the developers not merely 'translate' the Kazakh language. A language has a soul, a history. Let them consult the poets, writers, and linguists who know it. Otherwise they'll strip our language of its beauty. I consider this important as a matter of national identity.

Interviewee 5

Interview language: Russian. Profile: IT specialist in Astana; late 20s; Kazakh-dominant in personal life, works in Russian/English; very heavy AI user.

— Original transcript —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Постоянно, это часть моей работы. Я айтишник, поэтому в течение дня десятки раз что-то гуглю — документацию, ошибки, решения. Плюс обычные бытовые вещи: новости, погода, куда сходить.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

В основном Google и Stack Overflow по работе. Из ИИ — ChatGPT каждый день, иногда Claude для кода. Gemini пробовал, но не прижился.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

ChatGPT — ежедневно, без преувеличения. Код, письма, объяснения сложных тем. Claude тоже использую, особенно когда нужен разбор большого куска кода. Так что да, очень часто.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

По работе — английский и русский. Но казахский для меня родной, я на нём с семьёй, с друзьями говорю. И вот именно поэтому мне обидно, что с ИИ на казахском почти не получается нормально работать.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

Пробовал, да. Хотел сделать поздравление отцу на юбилей на красивом литературном казахском. Попросил ChatGPT. Он выдал текст, который звучал как плохой официальный документ — сухо, с канцеляризмами. Живой казахский так не звучит. Пришлось почти всё переписывать самому.

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Регулярно. Если мне нужен качественный результат, я сразу пишу по-русски или по-английски. Тот же тост отцу — я в итоге набросал идею на русском, ИИ помог структурировать, а на казахский перевёл сам, вручную. На казахском напрямую просто не выходит.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

Разница огромная. На английском — глубоко, подробно, с нюансами. На русском — тоже хорошо. На казахском — коротко, поверхностно, иногда с ошибками в окончаниях. Как айтишник скажу: похоже, для казахского просто мало обучающих данных, модель его 'знает' хуже.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

Была ситуация. Я попросил объяснить один юридический момент — про трудовой договор — на казахском. Ответ был расплывчатый, а один термин он вообще перевёл дословно, получилась бессмыслица. Я, зная казахский, сразу увидел, что это калька с русского, а не нормальный юридический казахский.

Q3.2: When that happened, what did you do next?

Переключился на русский, получил внятный ответ, а нужные термины на казахском уточнил уже на официальном сайте. Обычно так и делаю: черновой ответ на русском, а казахскую терминологию проверяю отдельно. ИИ на казахском для меня — не источник, а в лучшем случае черновик.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

Да. Однажды он дал мне неправильное название государственной услуги на казахском — такого термина просто не существует, он его придумал. Я чуть не вписал это в документ. Проверил на egov — там формулировка совсем другая.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

Юридические вопросы, госуслуги, официальная терминология — вот где я вообще не доверяю казахскому. Там ошибка стоит дорого. Новости на казахском он тоже плохо обобщает. По здоровью на казахском даже не спрашиваю — страшно.

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

Тот случай с несуществующим термином мог обернуться проблемой — я бы сдал документ с ошибкой, и его вернули бы. Потерял бы время, а то и получил бы штраф. Плюс постоянная потеря времени: я фактически делаю двойную работу, когда нужен казахский текст.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Однозначно да. И вот что обидно: я сам в привилегированном положении, потому что знаю русский и английский. А представьте человека из аула, который думает и говорит только на казахском. Для него эти инструменты работают вполсилы. Технологии как будто не для него сделаны.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

Считаю это критически важным. Мы говорим о цифровом равенстве. Если казахский останется языком, который ИИ понимает плохо, то носители языка будут вынуждены переходить на русский или английский, чтобы получить нормальный результат. И язык постепенно вытеснится из цифровой среды. Это вопрос не удобства, а выживания языка.

Q5.2: Is there anything else about your experience you think is important to share?

Как технический специалист добавлю: проблема решаемая, но нужны данные и воля. Казахского текста в интернете мало, качественного — ещё меньше. Пока компании не вложатся в это специально, само не исправится. И жаль, потому что язык красивый и заслуживает нормальных инструментов.

— English translation —

Block 1 — Background and Technology Use

Q1.1: How often do you use the internet for finding information in your daily life?

Constantly, it's part of my job. I'm in IT, so during the day I Google something dozens of times — documentation, errors, solutions. Plus ordinary everyday things: news, weather, where to go.

Q1.2: Which tools or platforms do you typically use when you need to look something up?

Mainly Google and Stack Overflow for work. As for AI — ChatGPT every day, sometimes Claude for code. I tried Gemini, but it didn't stick.

Q1.3: Have you ever used an AI assistant such as ChatGPT, Gemini, or Claude? If so, how often?

ChatGPT — daily, without exaggeration. Code, emails, explanations of complex topics. I use Claude too, especially when I need to analyze a large chunk of code. So yes, very often.

Block 2 — Language and AI

Q2.1: When you use AI tools, which language do you typically use — Kazakh, Russian, or another?

For work — English and Russian. But Kazakh is my native language; I speak it with family and friends. And that's exactly why it upsets me that with AI you almost can't work normally in Kazakh.

Q2.2: Have you ever tried using an AI tool in Kazakh specifically? What prompted that, and what happened?

I did try. I wanted to make a birthday tribute for my father in beautiful literary Kazakh. I asked ChatGPT. It produced a text that sounded like a bad official document — dry, full of bureaucratese. Living Kazakh doesn't sound like that. I had to rewrite almost all of it myself.

Q2.3: Do you ever switch to Russian because you feel it gives better results? Describe a situation.

Regularly. If I need a quality result, I write in Russian or English right away. That same toast to my father — in the end I sketched the idea in Russian, the AI helped structure it, and I translated it into Kazakh myself, by hand. Directly in Kazakh it just doesn't work.

Q2.4: Have you noticed differences in how well AI responds depending on which language you use?

The difference is enormous. In English — deep, detailed, with nuance. In Russian — also good. In Kazakh — short, superficial, sometimes with errors in the endings. As an IT person I'll say: it looks like there's simply little training data for Kazakh, the model 'knows' it worse.

Block 3 — Experiences with Failure

Q3.1: Can you describe a time when an AI gave you a response in Kazakh that felt wrong, confusing, or unhelpful?

There was a situation. I asked it to explain a legal point — about an employment contract — in Kazakh. The answer was vague, and one term it translated literally, producing nonsense. Knowing Kazakh, I immediately saw it was a calque from Russian, not proper legal Kazakh.

Q3.2: When that happened, what did you do next?

I switched to Russian, got a clear answer, and checked the necessary Kazakh terms on the official site. That's what I usually do: a rough answer in Russian, and I verify the Kazakh terminology separately. For me, AI in Kazakh isn't a source — at best it's a draft.

Q3.3: Have you ever received information from an AI in Kazakh that you later found out was incorrect?

Yes. Once it gave me a wrong name for a government service in Kazakh — such a term simply doesn't exist, it made it up. I almost wrote it into a document. I checked on egov — the wording there was completely different.

Block 4 — Consequences

Q4.1: Are there specific topics where AI tools are particularly unreliable in Kazakh (legal, government, health, news)?

Legal questions, government services, official terminology — that's where I don't trust Kazakh at all. There a mistake is costly. It also summarizes Kazakh news poorly. I don't even ask about health in Kazakh — it's frightening.

Q4.2: Has an AI's failure in Kazakh ever had a real consequence for you?

That case with the nonexistent term could have turned into a problem — I'd have submitted a document with an error, and it would have been returned. I'd have lost time, maybe even been fined. Plus the constant loss of time: I essentially do double the work whenever I need a Kazakh text.

Q4.3: Do Kazakh-dominant speakers face a disadvantage compared to Russian or English speakers with AI tools?

Absolutely yes. And here's what's upsetting: I'm in a privileged position myself, because I know Russian and English. But imagine a person from an aul who thinks and speaks only in Kazakh. For him these tools work at half power. It's as if the technology wasn't made for him.

Block 5 — Broader Reflections

Q5.1: How important do you think it is for AI tools to work well in Kazakh?

I consider it critically important. We're talking about digital equality. If Kazakh remains a language the AI understands poorly, native speakers will be forced to switch to Russian or English to get a normal result. And the language will gradually be pushed out of the digital space. It's not a question of convenience, but of the language's survival.

Q5.2: Is there anything else about your experience you think is important to share?

As a technical specialist I'll add: the problem is solvable, but it needs data and will. There's little Kazakh text online, and even less quality text. Until companies invest in this specifically, it won't fix itself. And that's a shame, because the language is beautiful and deserves proper tools.