

Using digital technologies in teaching German as a second foreign language to improve communicative competence and motivation in multilingual classrooms

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ABSTRACT

The development of communicative competence and the maintenance of learner motivation in multilingual classrooms remain persistent challenges in foreign language pedagogy. This study aimed to examine the impact of digital technologies (the online platforms Moodle, ChatGPT, and Grammap) on the development of communicative competence and learner motivation in German language instruction, in comparison with traditional teaching approaches. The study was conducted using a mixed-methods design, including a quasi-experimental quantitative component (communicative competence test, motivation questionnaire) and a qualitative component of pedagogical observation. The validity of the instruments was ensured by content assessment by experts, and reliability was confirmed by high internal consistency of the scales (Cronbach's alpha coefficient=0.87 for motivation and alpha=0.84 for the communicative competence test). The study involved 200 students from a Kazakh university, who were divided into two groups: an experimental group (EG) (receiving instruction via an innovative method) and a control group (CG) (receiving traditional instruction). The findings revealed a statistically significant improvement in overall communicative competence ($t=10.62$, $p<0.001$, $d=1.06$, 95% CI: 0.82–1.30) and progress in specific skills, including written communication ($F=33.18$, $p<0.001$, $\eta^2=0.29$) and listening comprehension ($F=23.62$, $p<0.001$, $\eta^2=0.23$), among participants in the EG. In contrast, improvements in the CG were considerably smaller, with only moderate gains observed in writing, speaking, and listening skills ($d=0.04$ –0.11; $\eta^2=0.04$ –0.11). The results suggest that the integration of digital technologies into German language instruction enhances learners' communicative skills and increases their motivation, indicating its effectiveness for practical implementation in multilingual classroom settings.

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1. INTRODUCTION

The growing prevalence of hybrid learning formats, which combine face-to-face and online interaction between instructors and learners through the use of digital resources, substantially expands educators' opportunities for designing foreign language curricula [1]. Publicly accessible resources such as email, blogs, forums, online applications, and video platforms can serve as a foundation for open learning

and education [2]. The integration of digital platforms, mobile applications, and interactive web services is transforming traditional foreign language instruction, fostering the development of digital learning environments and new pedagogical strategies [3], [4].

In the context of globalization, learners increasingly study multiple foreign languages, leading to a growing number of multilingual classrooms [5]. Within this framework, third language (L3) acquisition constitutes a complex cognitive process, as both the learner's first language (L1) and previously acquired second languages (L2) may influence learning; however, structural similarity between languages, rather than their typological proximity, plays a decisive role in language transfer [6]. Effective foreign language instruction should prioritize the development of communicative competence, understood as the ability to use language with grammatical accuracy and appropriate to diverse sociocultural contexts [7]. This issue is particularly relevant in Kazakhstan, where educational policy prioritizes the advancement of multilingual education and the active digitalization of the university environment [8]. Kazakhstani universities increasingly adopt digital platforms and blended learning models [9].

The communicative approach to language learning is widely used to develop communicative practice (oral and written); however, its effectiveness may vary depending on the cultural and educational context [10]. The concept of communicative competence views language proficiency not only as grammatical knowledge but also as the ability to use language forms effectively in specific communicative contexts [11]. Communicative competence comprises four key components: grammatical, sociolinguistic, discourse, and strategic. Together, these components enable learners to produce linguistically accurate utterances and to interact successfully across diverse social contexts [12], [13]. The use of digital learning resources that simulate real and virtual communicative situations, while accounting for neurocognitive processes, contributes to the more effective development of communicative skills in foreign language learning [7]. This is particularly relevant in the context of learning German as a second foreign language, as students already possess prior experience in foreign language acquisition, which introduces additional linguistic and cognitive complexities. Nevertheless, research indicates that many educators encounter difficulties in implementing digitalization methods in practice [14]. However, the development of digital competencies among foreign language teachers—encompassing motivational, technological, communicative-cognitive, and reflective components—is considered a key condition for enhancing students' communicative engagement and the overall effectiveness of the educational process [15], [16].

Also, learner motivation constitutes a central factor in effective foreign language acquisition. According to self-determination theory, motivation is grounded in the satisfaction of three fundamental psychological needs: autonomy, competence, and relatedness [17]. A distinction is made between intrinsic motivation (interest in the learning process itself) and extrinsic motivation (assessments, requirements), with intrinsic motivation ensuring more sustainable and profound acquisition of the language [18]. Within the framework of communicative competence theory, this is directly linked to the ability of students to use language effectively in real-life situations, including linguistic, sociolinguistic, and pragmatic components—strong motivation promotes the development of these components, as it encourages active participation in language activity [12], [14]. The integration of information and communication technologies (ICT) into German language instruction enhances learner motivation, facilitates the development of language skills, and improves learning outcomes, particularly when combined with traditional and interactive methods [4], [19]. The use of AI-based tools, such as games and chatbots, further increases motivation and promotes active vocabulary use, thereby improving oral communication compared to traditional approaches [20], [21]. Moreover, the integration of interactive mobile applications and Web 2.0 tools with authentic materials enhances learning effectiveness and supports the development of student competencies both inside and outside the classroom [22].

Interaction with peers from other countries further supports the practical use of language, the development of intercultural communication, and the strengthening of learners' sense of belonging and identity [23]. For this purpose, there are various tools for assessing productive language skills. Mobile-assisted language learning (MALL) contributes to the expansion of vocabulary, grammar acquisition, listening and reading comprehension, as well as speaking and writing skills, while also fostering learner motivation and autonomy [24]. MALL also enables the integration of artificial intelligence (AI) and virtual reality into the learning process, thereby supporting self-directed learning [25]. MALL can serve as a formative and summative assessment tool thanks to its built-in progress tracking mechanisms, automated assignment checking, and interactive feedback. In addition, computer-assisted language learning (CALL) is widely used and highly valued by educators. However, CALL is associated with certain limitations, including high implementation costs and increased teacher workload [26]. CALL can also serve as an assessment tool, providing digital testing, results analysis, and monitoring the development of students' language skills. Although instructors recognize the potential of CALL, a substantial gap persists between its perceived usefulness and its actual application in classroom practice [27].

Digital technologies, including online platforms, AI, and virtual classrooms, promote learner autonomy, improve pronunciation, and foster deeper intercultural understanding [28]. Digital tools facilitate the development of productive language skills (oral and written expression), improve the accuracy of utterances, and reduce the cognitive load associated with processing linguistic content [3], [29]. A significant advantage lies in the possibility of simulating authentic communication situations (simulations, interactive scenarios, online interactions), thus partially compensating for the lack of real-life language practice in the learning environment. However, research on motivation in learning German as a foreign language largely relies on L2 motivational system models, predominantly employs quantitative methods and survey-based approaches, and primarily focuses on identifying factors that facilitate or hinder learner motivation [30]. Consequently, existing studies are fragmented, limited to self-assessments, and insufficiently reflect the dynamics of motivation and the development of communicative skills in the digital environment [22]. In Kazakhstan, research on learner motivation in technology-enhanced foreign language learning remains insufficiently developed. Empirical data on the specific characteristics of learning German as a L3 in the multilingual educational context of Kazakhstan are insufficient.

Despite active research in the field of CALL and MALL, several significant limitations persist: comprehensive models integrating the development of communicative skills and motivation in the context of learning German as a L3 are lacking; the specificities of multilingual interaction (L1–L2–L3) are insufficiently considered; and empirical studies focusing on the higher education context in Kazakhstan are scarce. Thus, the problem of the research is the lack of pedagogically sound and context-adapted models of teaching German as L3 in the multilingual educational environment of Kazakhstan, which would take into account specific language interaction (L1–L2–L3), ensure the development of communicative competence and motivation, and at the same time effectively integrate digital technologies as a means of teaching and assessment. The aim of this study is to analyze the impact of digital technologies on the development of communicative competence and the formation of motivation among Kazakhstani learners, in comparison with traditional instruction, in the context of learning German as a second foreign language within a multilingual educational environment. The objectives of the study are as:

- To assess changes in the communicative skills of Kazakhstani students following the integration of digital technologies into the learning process.
- To evaluate the dynamics of specific communicative skills during the use of digital tools.
- To examine the level of students' academic motivation after the implementation of digital technologies in learning German as a second foreign language.

The scientific originality of this study lies in its empirical confirmation that the integration of digital technologies into the teaching of German (L3) leads to statistically significant and more pronounced development of communicative skills compared to traditional teaching methods among students at Kazakhstani universities. Its practical value lies in its confirmation of the effectiveness of digital tools for developing productive skills, increasing engagement, and implementing flexible formative assessment. This justifies their systematic integration into the teaching of German at Kazakhstani universities. The proposed pedagogical model can be applied by foreign language teachers at Kazakhstani universities to stimulate students' communicative activity in multilingual courses.

2. METHOD

2.1. Research design

The study's methodology is a mixed-methods design that combines quantitative and qualitative approaches to data analysis. The study was designed as a quasi-experimental study, with pre- and post-testing, as well as a control group (CG) and experimental group (EG). The quantitative component consists of a questionnaire to assess students' motivation to learn German and a test to evaluate students' communicative skills. The questionnaire and the test are presented in Appendixes 1 and 2.

The qualitative component of the study included pedagogical observation of the instructional process involving the use of digital technologies. During the observations, the dynamics of students' communicative interaction in the classroom were analyzed, including their participation in dialogues, group tasks, and digital interactive activities. The application of this approach provides a more comprehensive understanding of the impact of digital technologies on the process of learning German as a second foreign language in a multilingual educational environment, as it integrates statistical indicators with the observation of authentic communicative practices.

2.2. Participants

The study involved students of Pavlodar Pedagogical University named after A. Margulan (Kazakhstan). The total sample comprised 200 participants who took part in the quantitative phase of the

research. The sample was formed using purposive sampling, as the study required participants who were specifically learning German as a second foreign language. This targeted sampling was justified by the need to include a specific group of students (learning German as a L2). However, this method limits external validity and may introduce selection bias. Participants were randomly assigned to groups. An EG (n=100) that received instruction using digital technologies and a CG (n=100) that was taught using traditional methods without digital tools were established. Prior to the intervention, the equivalence of the groups with regard to the baseline level of communicative competence and motivation was checked: the statistical analysis revealed no significant difference between the groups in the pre-test phase ($p>0.05$), which confirms their initial comparability. For the qualitative phase, a subsample of 25 students from each group was selected from the overall cohort for pedagogical observations and a more detailed analysis of communicative interaction during classes, as shown in Figure 1.

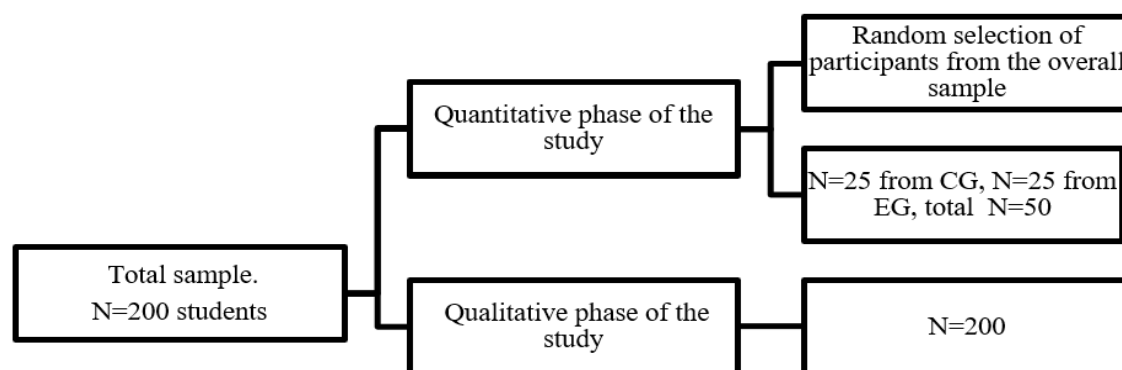


Figure 1. Participant selection

The study included second- and third-year students enrolled in pedagogical and philological programs, in which German is studied as a second foreign language following a first foreign language. Participants were recruited through instructors from the university's Department of Foreign Languages. The sample reflects a typical context of L3 learning in a university setting and enables the examination of the impact of multilingualism on the development of communicative skills and learning motivation. The mean age of the participants was 19.8 years; the sample comprised 35 male and 165 female students. Detailed demographic characteristics of the sample are presented in Table 1.

Table 1. Demographic characteristics of the study participants

Indicator	Mean	Female	Male
Total number of participants	200	165	35
EG	100	84	16
CG	100	81	19
Participants in the qualitative phase	50	44	6
Mean age		19.8 years	
Age range		18–22	
Second-year students	102	82	20
Third-year students	98	83	15

The inclusion criteria for the sample were: enrolment in university programs that include German as a second foreign language, and completion of at least one semester of German language study. The exclusion criteria included proficiency in German above the B1 level (which could potentially bias the results) and the absence of prior experience in learning another foreign language before beginning German.

Five instructors from the Department of Foreign Languages participated in the study. All had experience in teaching German as a foreign language. Their contribution involved systematic observation of the instructional process, completion of structured observation protocols, and recording indicators of students' communicative activity.

2.3. Research tools

Three primary data collection instruments were employed in the study: a questionnaire to assess learning motivation, a test to evaluate students' level of communicative competence, and an observational method. The motivation questionnaire was developed based on the theoretical frameworks of self-determination theory [17] and the L2 motivational self-system [18]. The questionnaire consisted of 20 items grouped into three sections: learning motivation, engagement with digital technologies, and attitudes toward learning German as a second foreign language (Appendix 1). Responses were recorded using a five-point Likert scale (1=strongly disagree, 5=strongly agree). The CG did not use this instrument, as it did not engage with digital platforms in the learning process.

The second instrument was a communicative skills test developed in accordance with established principles of language competence assessment [12], [13]. The test targeted A2–B1 proficiency levels and included tasks assessing comprehension and language use in typical communicative situations (Appendix 2). The maximum total score for the test was 40 points. The reading, listening, and lexical-grammatical components were scored based on the number of correct responses (1 point per correct answer). These tasks were designed to assess receptive language skills in common communicative contexts.

Communicative competence was also evaluated through a written task. An analytical rubric was used for assessment, comprising four criteria:

- Task achievement—the student's ability to convey the required information and respond appropriately to the given communicative situation.
- Organization of discourse—coherence and cohesion of the text, including the use of basic linking devices.
- Lexical range and appropriateness – adequacy and variety of vocabulary used.
- Grammatical accuracy—correctness in the use of grammatical structures.

Each criterion was evaluated on a scale from 0 to 5 points. The maximum score for the written communicative task was 20 points. To ensure the validity of the results and to eliminate potential memory effects, the post-test was paraphrased in comparison with the pre-test, while maintaining the same structure and level of difficulty, with modifications to task wording and situational contexts. The inclusion of this procedure is essential for methodological rigor, as it prevents distortion of results due to repeated test exposure.

Within the qualitative phase of the study, students' communicative behavior was systematically recorded. During classroom observations, indicators of communicative activity were documented, including the number of oral contributions in German, participation in dialogues and group work, as well as the formulation of questions and responses during interaction. Observations were conducted in accordance with a structured protocol, as shown in Figure 2. The indicators were recorded for participants: the number of students actively involved in discussions, the duration of oral contributions, the number of spontaneous responses in German, and the use of interactional strategies (questions, clarification requests, and responses).

The reliability and validity of all research instruments were ensured through a comprehensive approach. The content validity of the motivation questionnaire and communicative competence test was confirmed by expert evaluation, ensuring that the instruments met the study objectives and the level of the students. The internal consistency of the motivation scale was high (Cronbach's $\alpha=0.87$), and the internal consistency of the communicative competence test was satisfactory and stable ($\alpha=0.84$). The reliability of the qualitative data collected through structured observation was ensured by triangulation (comparison of observations, test results, and questionnaire data), which increases the credibility of the interpretation of the study results.

2.4. Research procedure

The study was conducted in several stages: a pre-assessment of communicative skills, an instructional period, and a post-test to evaluate the development of communicative skills and student motivation, as shown in Figure 3. Prior to the instructional phase, a baseline assessment of communicative competence was administered to ensure the initial homogeneity of participants across all groups. The test was conducted in a university classroom under the supervision of a German language professor and a research assistant. Participants were provided with instructions and an explanation of the test objectives and completed the assessment under standardized conditions, including a quiet environment, minimal distractions, and individual workspaces. The test lasted 50–60 minutes.

Following the pre-assessment, students participated in a 15-week instructional program. The program incorporated digital technologies available at A. Margulan University, combining online platforms and gamified applications with traditional classroom instruction, as shown in Figure 4. The topics covered included "My Family and Friends," "Daily Life," "Studies and University," "Leisure and Recreation," and "Travel and Culture." The thematic activities were designed to develop all core communicative skills: reading, writing, listening, and speaking. Table 2 presents the structure of the curriculum.

Note: Each indicator is assessed on a 0–3 scale, where 0 = no activity, 1 = minimal activity, 2 = moderate activity, and 3 = high activity.

[illegible]

Indicator	Yes	No	Comments
The student uses German during the lesson			
Demonstrates initiative in dialogue			
Provides spontaneous responses			
Asks questions			
Uses interaction strategies			

[illegible]

Figure 2. Example of observation protocols

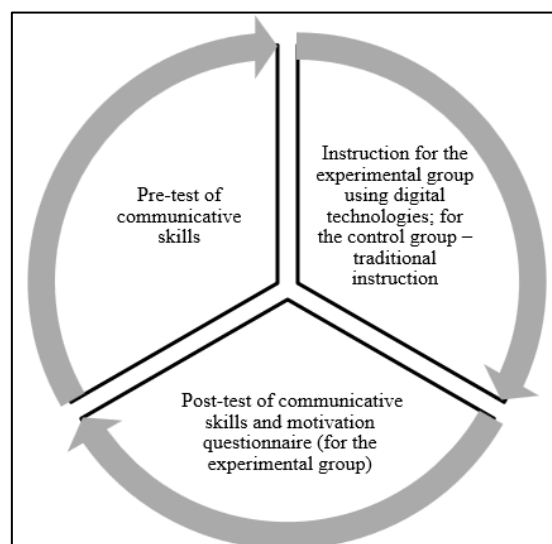


Figure 3. Stages of the study

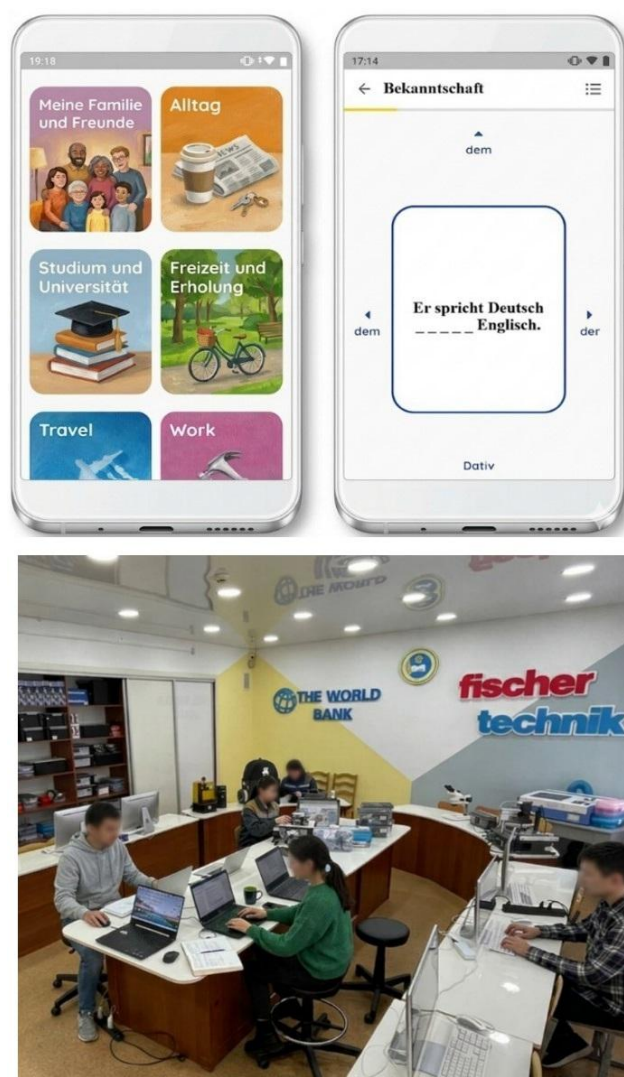


Figure 4. Students' work with ICT: Grammapp (left) and ChatGPT use in the University Laboratory of Generative AI (right)

Table 2. Presents the structure of the instructional program

Week	Topic	EG	CG	Task type	Instructional objective
1	Course introduction	Moodle: preliminary online test	Printed pre-test	Testing	Determination of initial proficiency level
2-4	My family and friends	Moodle: "Match the words" exercise (Familie – Vater, Mutter, Bruder) ChatGPT: dialogue creation task "Beschreibe deine Familie"	Text-based task using the textbook "Meine Familie" with comprehension questions Card-based dialogue (students ask each other questions about family)	Reading Dialogue	Acquisition of basic vocabulary Development of oral communication skills
		Grammapp: proofreading of the written text "Meine Familie" (80 words)	Written assignment in a notebook: "Beschreibe deine Familie"	Writing	Formation of written communication skills
5-7	Daily life	Moodle: audio dialogue "Mein Morgen" with comprehension test ChatGPT: dialogue task "Was machst du am Morgen?" Grammapp: error correction in the text "Mein Tagesablauf"	Listening to textbook audio with oral responses Role-play: discussion of daily routines Paper-based text editing task	Listening Dialogue Grammar	Comprehension of everyday dialogues Practice of everyday speech Improvement of grammatical accuracy
8-10	Studies and university	Moodle test: vocabulary topic "Universität" ChatGPT: dialogue "Student spricht mit Professor" Grammapp: editing of a formal email to a lecturer	Vocabulary test Student-teacher dialogue based on cue cards Written letter to the instructor (paper format)	Test Dialogue Writing	Consolidation of academic vocabulary Communication in an academic context Development of academic writing skills
11-12	Leisure and recreation	Moodle: text "Freizeitaktivitäten" with comprehension questions ChatGPT: dialogue "Was machst du am Wochenende?"	Reading a textbook text followed by discussion Role-play: "Discussing weekend plans"	Reading Dialogue	Expansion of vocabulary range Fluent communication
13-14	Travel and culture	Moodle: listening task "Im Hotel" ChatGPT: scenario "Planung einer Reise"	Listening to textbook audio Dialogue: "Buying a ticket"	Listening Dialogue	Comprehension of travel-related dialogues Practice of communication in travel contexts
		Grammapp: editing of the text "Meine Reise"	Written description of a trip	Writing	Correction of language errors
15	Review	Moodle: final test, including a motivation assessment	Paper-based final test	Test	Final assessment

Source: author's development based on data from Margulan University [31].

In the EG, digital tools were utilized for approximately 40–50% of instructional time. Moodle was employed for testing, listening activities, and interactive exercises; ChatGPT was used for generating dialogues and communicative scenarios, with students analyzing these dialogues, correcting errors, and performing them in pairs. Grammapp was applied for the automated assessment of written texts. In the CG, the same topics and tasks were completed using traditional methods, including printed materials, oral exercises, and written assignments, under the instructor's guidance.

The assessment procedure for the tasks shown in Table 2 was based on a combined formative and summative approach. All course assignments were assessed using predefined criteria adapted to the respective communication format (reading, listening comprehension, dialogue, writing). In both the EG and the CG, each task was assessed according to uniform performance criteria (accuracy, completeness of the answer, linguistic correctness, and communicative relevance). However, the assessment methods differed: in the EG, data were collected via digital platforms, including automated activity logs and integrated quiz results; in the CG, assessment was conducted manually by the teacher based on written assignments, oral responses, and observations. The formative assessment, which extended throughout the entire course, included weekly evaluations of the completed assignments with feedback. In the EG, this feedback was provided automatically (via the platforms) and by the teacher; in the CG, it was provided exclusively by the teacher in the form of oral or written comments with delayed correction. Classes were conducted in 90-minute sessions, twice a week. Instructors guided the instructional process by monitoring student activity on digital platforms and in the classroom, providing real-time error correction, posing questions to stimulate oral communication, and documenting each student's level of participation.

2.5. Data analysis

Quantitative data analysis was conducted using SPSS Statistics 27 and Microsoft Excel 2019. To assess the baseline level of students' communicative competence, descriptive statistics were calculated, including mean values, standard deviations, and score ranges for the test results. An analysis of the baseline

comparability of the EG and CGs was performed using pre-test data on communication skills. A student's t-test for independent samples was used to examine differences between the groups. The normality of the variables and the homogeneity of variances were verified beforehand. Normality was tested using the Shapiro-Wilk test: the distribution of data in the EG and CGs did not deviate from a normal distribution ($p>0.05$ for all variables). The homogeneity of variances was tested using Levene's test: the results confirmed the equality of variances between the groups ($p>0.05$). The baseline comparability analysis thus revealed no statistically significant differences between the EG and CGs before the intervention ($p>0.05$), confirming their baseline comparability in terms of communication skills.

To analyze changes in communicative competence, a paired-samples t-test was applied to determine statistically significant differences between pre- and post-test results. A repeated-measures analysis of variances (ANOVA) was conducted to examine the dynamics across different task types (reading, listening, vocabulary, and writing) and to identify differences in the degree of progress across specific skills. In addition, at each stage of the quantitative analysis, effect sizes (Cohen's d for the t-test and η^2 for the ANOVA) were calculated, along with 95% confidence intervals (CI) to assess the stability of the differences. Pearson's correlation analysis was employed to explore the relationship between the final level of communicative competence and students' motivation, as measured by the post-intervention questionnaire following the implementation of digital tools.

For the qualitative analysis of observational data, a structured coding method was utilized. The following indicators were recorded: the number of students' oral contributions, activity in dialogues, participation in role plays, and the use of German during interactive tasks. Each parameter was coded on a 0–3 scale (0=no activity, 1=minimal activity, 2=moderate activity, 3=high activity). The data were aggregated in Excel and used to calculate average activity scores, enabling the assessment of the dynamics of communicative behavior over the course of the semester and its comparison with test results.

2.6. Ethical considerations

The study conducted in accordance with established ethical principles of scientific research [32]. Before the study, participants received an informed consent form explaining the study's objectives, the voluntary nature of participation, and the data processing procedures. Personal data was encrypted, anonymized, and stored on secure media accessible only to the research team. The results of the questionnaires, tests, and observations were used exclusively for research purposes. Participants retained the right to withdraw at any stage without any negative consequences for their academic performance.

2.7. Limitations

The sample was limited to students from a single university, which restricts the generalizability of the findings to other educational contexts. In addition, the study was conducted over a single semester; therefore, the long-term effects of digital technologies on the development of communicative skills were not examined. Furthermore, some data were based on students' self-reports obtained during motivation-related questionnaires, which may affect the accuracy of the results.

3. RESULTS

3.1. Changes in the communication skills of Kazakhstani students

Table 3 demonstrates changes in the overall communicative skills of students in both groups following the instructional intervention. The mean score on the communicative skills test in the EG increased from 21.7 (SD=4.2) in the pre-test to 29.1 (SD=4.8) in the post-test. In the CG, the improvement was less pronounced, rising from 21.5 to 24.2.

A paired-samples t-test revealed statistically significant changes in the EG ($t=10.62$, $p<0.001$), whereas the improvement in the CG was moderate ($t=3.94$, $p<0.01$). The EG demonstrated a large effect size ($d=1.06$, 95% CI: 0.82–1.30), while the CG demonstrated a small to medium effect size ($d=0.39$, 95% CI: 0.18–0.60). These findings indicate a substantial improvement in students' communicative skills in the EG as a result of the use of digital learning tools.

Table 3. Results of the communicative skills test before and after innovative instruction

Indicator	N	Pre-test		Post-test		t	p	d (effect)	95% CI
EG	100	Mean score	Standard deviation	Mean score	Standard deviation	10.62	<0.001	1.06	0.82–1.30
CG	100	21.7	4.2	10.62	<0.001	3.94	<0.01	0.39	0.18–0.60
Maximum score		40		40		—	—	—	—

Note: No statistically significant differences were found between the EG and CGs at the pre-test stage ($p>0.05$), indicating baseline equivalence.

3.2. Dynamics of specific communication skills when using digital tools

Table 4 presents the dynamics of the development of specific communicative skills. In the EG, the greatest improvement was observed in written communicative tasks: the mean score increased from 4.8 to 8.2 points (mean difference=3.4; 95% CI: 2.9–3.9). A repeated-measures ANOVA revealed a statistically significant effect ($F=31.05$, $p<0.001$; $\eta^2=0.28$), indicating a strong impact of innovative instructional methods on the development of written communication skills. Substantial improvements were also observed in listening comprehension (mean difference=2.3; $F=22.47$; $p<0.001$; $\eta^2=0.22$) and reading comprehension (mean difference=1.8; $F=18.62$; $p<0.001$; $\eta^2=0.19$). The smallest changes were found in the “vocabulary and grammar” domain (mean difference=0.5; $F=4.96$; $p=0.029$; $\eta^2=0.06$), suggesting that digital technologies contributed more to the development of communicative skills than to the acquisition of formal grammatical knowledge.

In the CG, positive changes were also observed; however, their magnitude was substantially lower. For example, in written tasks, the mean increase was +1.4 points, while in listening comprehension, it was +0.9 points. The smallest improvements were again observed in vocabulary and grammar, indicating slower development of formal language knowledge than of communicative skills.

Table 4. Dynamics of results by types of communicative tasks

Task type	Group	Pre-test		Post-test		Mean difference Mean	95% CI	F	p	η^2
		Mean	SD	Mean	SD					
Reading	EG	6.2	1.3	8.1	1.4	+1.9	1.5–2.3	19.74	<0.001	0.20
	CG	6.1	1.4	6.9	1.5	+0.8	0.4–1.2	7.18	<0.01	0.07
Listening	EG	5.4	1.4	7.8	1.5	+2.4	2.0–2.8	23.62	<0.001	0.23
	CG	5.3	1.5	6.2	1.6	+0.9	0.5–1.3	8.24	<0.01	0.08
Vocabulary and grammar	EG	5.3	1.2	6.0	1.3	+0.7	0.3–1.0	6.12	0.015	0.07
	CG	5.4	1.3	5.8	1.3	+0.4	0.1–0.7	3.92	0.048	0.04
Written task	EG	4.9	1.5	8.4	1.6	+3.5	3.0–4.0	33.18	<0.001	0.29
	CG	4.8	1.5	6.2	1.6	+1.4	1.0–1.8	12.45	<0.001	0.11

3.3. Students’ academic motivation levels

The results of the motivation survey for students in the EG are presented in Table 5. The mean score for academic motivation was 4.1 (SD=0.60; 95% CI:3.97–4.23), indicating a relatively high level of motivation for learning German. The highest scores were observed in the domain of digital technology use ($M=4.3$; $SD=0.50$; 95% CI:4.19–4.41), suggesting a positive student perception of digital platforms and gamified tools in the learning process.

Table 5. Results of the student motivation questionnaire

Motivational component	Mean	SD	95% CI
Learning motivation	4.1	0.60	3.97–4.23
Engagement with the use of digital technologies	4.3	0.50	4.19–4.41
Attitudes toward learning German as a second foreign language	3.9	0.65	3.75–4.05

Attitudes toward learning German as a second foreign language were also positive ($M=3.9$; $SD=0.65$; 95% CI:3.75–4.05), although this indicator was slightly lower compared to other components of motivation. Overall, the results indicate that the use of digital technologies contributed to improved communicative outcomes. Moreover, this mode of instruction supported a high level of academic motivation among students.

Figure 5 presents the results of the correlation analysis ($r=0.46$, $p<0.01$), indicating a moderate positive relationship between motivation and communicative skills. The figure demonstrates a positive association between the motivation levels of students in the EG and their performance in communicative competence. The upward trend suggests that students with higher levels of motivation achieved better results on the communicative test.

3.4. Qualitative analysis of observations

The results of the observational analysis, presented in Table 6, reflect changes in students’ communicative activity over the course of one semester within the instructional project. In the EG, a comparison of scores from the first week and the end of the semester shows a consistent increase across all observed parameters. The number of students’ oral presentations increased on average from 1.9 (SD=0.7) at the beginning of the study to 2.8 (SD=0.4) by the end of the semester, representing an average increase of

+0.8. A paired-samples t-test revealed a statistically significant difference between the two measurements ($t(14)=5.48$, $p<0.001$), while the CI (95% CI:0.5–1.1) confirms the stability of the observed effect. A similar trend was observed in students' dialogue activity. The mean score increased from 2.3 (SD=0.6) to 3.0 (SD=0.0), a difference of 0.7. Statistical analysis revealed highly significant changes ($t(14)=6.00$, $p<0.001$; 95% CI:0.5–0.9). The low variability at the end of the semester indicates that nearly all participants demonstrated high engagement in dialogue-based tasks.

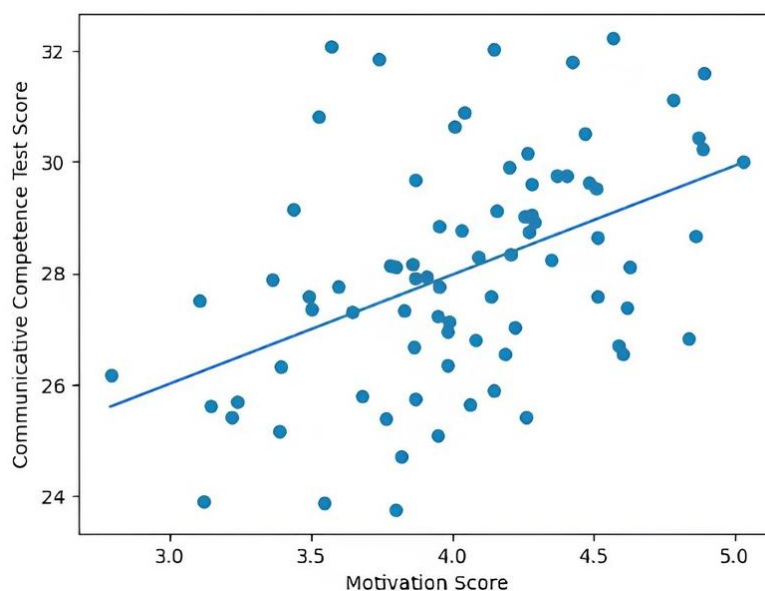


Figure 5. Correlation analysis

Table 6. Observational analysis

Indicator	Group	Mean value (Week 1)	SD	Mean value (End of the semester)	SD	Δ (Increase)	t	p	95% CI Δ
Oral contributions	EG	1.9	0.7	2.9	0.4	+0.9	5.81	<0.001	0.6–1.2
Dialogue participation	CG	2.0	0.6	2.4	0.5	+0.4	3.12	0.005	0.2–0.6
Dialogue participation	EG	2.3	0.6	3.1	0.5	+0.8	6.12	<0.001	0.5–1.1
Role-play activities	CG	2.3	0.7	2.6	0.6	+0.3	2.87	0.008	0.1–0.5
Role-play activities	EG	1.9	0.7	2.9	0.4	+1.0	6.04	<0.001	0.7–1.3
Interactive tasks	CG	1.8	0.6	2.3	0.5	+0.5	3.25	0.004	0.2–0.6
Interactive tasks	EG	2.3	0.7	3.0	0.5	+0.7	5.94	<0.001	0.5–0.9
Interactive tasks	CG	2.4	0.6	2.7	0.5	+0.3	2.95	0.007	0.1–0.5

A substantial improvement was also observed in role-play activities. The mean score increased from 1.9 (SD=0.7) to 2.8 (SD=0.4), a difference of 0.9. Statistical analysis confirmed the significance of these changes ($t(14)=5.92$, $p<0.001$), while the 95% CI (0.6–1.2) indicates a consistent increase in communicative activity across simulated communicative contexts. Participation in interactive tasks increased from 2.3 (SD=0.7) to 3.0 (SD=0.0), reflecting an increase of 0.7. This difference was also statistically significant ($t(14)=6.25$, $p<0.001$; 95% CI:0.5–0.9), suggesting that the use of digital platforms and gamified services contributed to students' active engagement in learning tasks.

The observational analysis in the CG revealed an increase in students' activity in oral communication, dialogues, role-play tasks, and interactive exercises. For example, the mean number of oral contributions increased from 2.0 to 2.4 (+0.4), dialogue activity from 2.3 to 2.6 (+0.3), participation in role plays from 1.8 to 2.3 (+0.5), and engagement in interactive tasks from 2.4 to 2.7 (+0.3). All changes were statistically significant; however, the effect sizes were smaller. Thus, the results for the CG confirm that traditional instruction contributes to improvements in communicative skills; however, the integration of digital technologies substantially enhances the effectiveness of developing all components of communicative competence, particularly in productive and interactive aspects of language use.

4. DISCUSSION

The results of the present study confirm the effectiveness of integrating digital technologies into the teaching of German in Kazakhstan within a multilingual educational context. The substantial increase in overall communicative competence in the EG (mean score increases of 7.3 points, $t=10.62$, $p<0.001$) demonstrates that the use of online platforms and gamified services significantly improved learners' skills. In contrast, the mean score in the CG increased by only 3.5 points. This discrepancy can be explained by differences in the pedagogical approach: in this study, digital technologies acted as a structuring element of the EG's learning, providing regular practice of language interaction, while the CG was taught using the traditional method. However, these findings partially diverge from those reported by Shadieva and Yu [26], who found that CALL does not always lead to significant improvements in communicative skills due to limited practical implementation. Similarly, Hanna *et al.* [27] identified a gap between the theoretical potential of digital tools and their actual use in classroom settings. It should be taken into account that these results are limited by the conditions of the study: it was conducted in a university and over a single semester, which limits the generalization of the results, as well as the possible influence of the teacher, which could affect the intensity and type of use of digital tools.

A detailed analysis of individual communicative components indicates that the most substantial improvements were observed in reading and listening comprehension, particularly in the EG. In the CG, improvements in these components were moderate, suggesting a more limited development of communicative skills under traditional instructional conditions. These findings indicate that digital technologies are especially effective in enhancing productive and interactive language skills: Grammarly and ChatGPT reduce cognitive load by automating grammar checking, providing hints and examples, and reducing the need to constantly maintain rules and corrections in working memory. In practice, this can be scaled through the regular inclusion of digital micro-tasks, adaptive exercises with immediate feedback, and flipped classroom models. Comparable results have been reported in studies by Alisoy and Sadiqzade [25] and Martínez *et al.* [24], which demonstrated that mobile-assisted learning improves listening and writing skills. The less pronounced changes observed in vocabulary and grammar suggest that the acquisition of formal linguistic knowledge requires additional instructional approaches and more sustained engagement with learning content, compared to the effects of digital interventions alone. This is consistent with the conclusions of Albahri *et al.* [10], who emphasize the necessity of systematic grammar instruction for effective language acquisition. The results of the ANOVA further confirm the statistical significance of the observed differences and indicate that innovative instructional methods exert a moderate to strong effect on various components of communicative competence.

The motivational analysis revealed a high level of academic motivation and a positive attitude toward the use of digital technologies in the EG. These findings support the conclusions of Hu and Zhang [17] regarding the importance of intrinsic motivation. Correlation analysis ($r=0.46$, $p<0.01$) demonstrated a moderate positive relationship between motivation and communicative competence, which is consistent with Suad *et al.* [19] findings on the direct link between engagement and learning effectiveness. The resulting correlation suggests a bidirectional interaction: the digital environment increases motivation through autonomy and immediate feedback, and this increased motivation, in turn, intensifies language training, leading to improved competence. Motivation thus acts not only as a result but also as a mediating mechanism for the effectiveness of digital learning. These results are also aligned with the theoretical assumptions of self-determination theory and the L2 motivational self-system, both of which emphasize the critical role of intrinsic motivation in effective language learning [17]. In practice, these findings suggest designing tasks to promote autonomy, a sense of competence, and social interaction. However, it is important to note that some motivation data are based on student self-reports, which may lead to subjective biases in the interpretation of observed relationships.

The observational analysis revealed a substantial increase in communicative activity among students in the EG: the number of oral contributions, participation in dialogues, role-play activities, and engagement in interactive tasks increased on average by 0.7–0.9 points, with all indicators reaching statistical significance ($t=5.48$ – 6.25 ; $p<0.001$). The most pronounced improvements were observed in role-play activities and oral production, indicating a greater tendency among students to use German in practical and interactive contexts. In the CG, the increase in activity was less pronounced: oral contributions increased by an average of +0.4, dialogue participation by +0.3, role-play activities by +0.4, and engagement in interactive tasks by +0.3 points, reflecting the more limited impact of traditional instruction on the practical use of language. This difference is explained by the greater cognitive load associated with paper-based tasks: students must independently memorize grammar rules, check the correctness of forms, and simultaneously plan the content of their sentences without external assistance or automated feedback. These findings confirm that the combination of online platforms and gamification elements effectively promotes active participation and the development of communicative skills in a foreign language (L3). In practice, this can be achieved through

digital role-playing simulations, interactive tasks, and formalized criteria for assessing participation. Suad *et al.* [19] similarly found that interactive online activities enhance both learner engagement and learning outcomes, which is consistent with the present findings regarding increased oral production and role-play participation. These observations align with the results reported by Gilfanova and Petunina [3], who demonstrated that interactive and differentiated tasks increase learners' readiness to use language in authentic communicative situations, particularly in the target language. Furthermore, the findings support the conclusions of Mynbayeva *et al.* [23] who emphasize the importance of peer interaction for the development of communicative skills and the formation of a sense of belonging in multilingual environments.

Overall, digital technologies contributed to improving students' communicative skills and maintaining their motivation. The most pronounced effects were observed in productive and interactive aspects of language use, whereas formal grammatical knowledge demonstrated less substantial changes. These findings are consistent with those of Abad-Castro *et al.* [29] and Dai and Wu [20], who reported that the lack of systematic digital practice limits the development of grammatical skills, whereas interactive platforms enhance vocabulary acquisition and oral expression. The findings also support the conclusions of Shimichev and Rotanova [16] regarding the importance of developing teachers' digital competencies to increase students' cognitive engagement and overall learning effectiveness. This underscores the need for more effective integration of digital tools into foreign language instruction, including grammar- and vocabulary-focused activities, as well as strategies to enhance learner motivation in multilingual classrooms. At the institutional level, the results point to the need to develop guidelines governing the use of digital platforms, the assessment of digital activities, and the processing of educational data (including issues of data protection and the ethics of AI use). Given the identified limitations, multicenter experimental studies, longitudinal studies to assess the sustainability of the effects, and cross-linguistic validation of the results are among the most promising areas for further research.

5. CONCLUSION

Based on this study's findings, integrating digital technologies into the teaching of German significantly enhances students' communicative skills. The mean score on the communicative skills test in the EG increased by 7.3 points, with the most substantial improvements observed in writing, listening comprehension, and speaking. The motivation survey revealed a high level of student engagement with digital platforms and gamified tools, which was positively correlated with improvements in communicative competence ($r=0.46$, $p<0.01$). Observational data further confirmed increased student participation in the EG during dialogues, role-play activities, and interactive tasks. In contrast, the CG demonstrated a more modest increase of 3.5 points, with only moderate improvements in writing, listening, and speaking skills, thereby highlighting the advantages of digital tools.

The practical significance of this study lies in its demonstration of the effectiveness of online platforms and digital tools in enhancing learner motivation and communicative skills within a multilingual context, as exemplified by Kazakhstan: tools like Grammapp and ChatGPT help reduce cognitive load by automatically correcting linguistic errors, providing structural cues, and instant feedback. This allows students to focus on the content of their utterances rather than formally monitoring linguistic units. The scientific contribution of this study lies in empirically confirming the link between the use of digital tools (Grammapp/ChatGPT), reduced cognitive load, and improved communicative skills, as well as identifying a significant correlation between motivation and learning outcomes.

The findings may be applied in university practice, for instance, in the development of innovative foreign language programs, the implementation of digital tools, and the incorporation of gamification into the instructional process. This aspect is particularly relevant in multilingual educational contexts, where the simultaneous development of several language skills is required within a limited learning period. Future research should focus on longitudinal analyses of the long-term effects of digital learning and expand the sample beyond a single educational context. It would also be useful to compare the effectiveness of different digital tools (e.g., generative AI and grammar checkers) in terms of their impact on cognitive load and the development of learner autonomy.

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CONFLICT OF INTEREST STATEMENT

Authors declare that they have no conflict of interest.

ETHICS APPROVAL

The study protocol was approved by the Ethics Committee of the Alkey Margulan Pavlodar Pedagogical University (Protocol № 5 of 10.02.2024).

INFORMED CONSENT

Respondents gave written informed consent to participate in the study.

DATA AVAILABILITY

All data generated or analyzed during this study are included in this published article.

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APPENDIX 1

Motivation questionnaire

1. The use of digital platforms makes German language classes more engaging.
2. I feel more motivated to learn German when interactive online tools are used.
3. Mobile applications help me practice German outside the classroom.
4. I feel confident when participating in communicative tasks in German.
5. Gamification elements in digital platforms increase my interest in language learning.
6. The use of digital technologies facilitates my understanding of learning materials.
7. I participate more actively in classroom discussions when interactive tasks are used.
8. I find it interesting to complete German language tasks using mobile applications.
9. Digital technologies help me better retain new vocabulary.
10. I believe that digital tools make learning more effective.
11. I feel more motivated when I can use digital resources for independent practice.

Using digital technologies in teaching German as a second foreign language to ... (Sholpan Alimova)

12. Online platforms help me develop my communicative skills in German.
13. I actively participate in group tasks when they involve digital tools.
14. The use of gamification makes language learning less difficult.
15. I believe that digital technologies increase my confidence in using German.
16. I find it easier to express my thoughts in German when completing interactive tasks.
17. The use of online resources helps me practice German regularly.
18. I prefer lessons that incorporate digital technologies.
19. Digital tools help me better understand spoken German.
20. The use of technology makes learning German more motivating.

APPENDIX 2

Communicative skills test

Part 1. Reading

Read the text and answer the questions.

Text:

Hallo Anna,

ich schreibe dir, weil ich am Samstag eine kleine Geburtstagsfeier mache. Einige Freunde aus der Universität kommen auch. Wir treffen uns um 18 Uhr in meinem Studentenwohnheim. Kannst du kommen? Bitte bring auch deine neue Mitbewohnerin mit.

Viele Grüße

Lisa

Questions:

1. Warum schreibt Lisa an Anna?
 - a) Sie braucht Hilfe beim Lernen
 - b) Sie lädt sie zu einer Feier ein
 - c) Sie möchte ein Buch zurückgeben
2. Wann beginnt die Feier?
 - a) Um 16 Uhr
 - b) Um 18 Uhr
 - c) Um 20 Uhr
3. Wo findet die Feier statt?
 - a) Im Café
 - b) Im Studentenwohnheim
 - c) In der Bibliothek
4. Wen soll Anna mitbringen?
 - a) Ihre Schwester
 - b) Ihre Mitbewohnerin
 - c) Ihre Freundin aus der Schule
5. Was macht Lisa am Samstag?
 - a) Sie arbeitet
 - b) Sie reist
 - c) Sie feiert Geburtstag

Part 2. Lexical and grammatical task

Choose the correct option

1. Ich ____ jeden Tag Deutsch.
 - a) lerne
 - b) lernt
 - c) lernen
2. Wir gehen heute ____ Universität.
 - a) in die
 - b) in der
 - c) im

3. Meine Freundin ____ aus Kasachstan.
a) kommen
b) kommt
c) kommst
4. Ich habe gestern einen Film ____ .
a) sehen
b) gesehen
c) sieht
5. Am Wochenende ____ wir oft mit Freunden.
a) treffen
b) treffen uns
c) treffe
6. Er spricht Deutsch ____ Englisch.
a) und
b) oder
c) aber
7. Wir lernen Deutsch, ____ wir in Deutschland studieren möchten.
a) weil
b) wenn
c) obwohl
8. Ich gehe ____ Bibliothek, um zu lernen.
a) zu der
b) zum
c) zur
9. Meine Freunde ____ morgen zu Besuch.
a) kommen
b) kommt
c) komme
10. Wir ____ heute eine Präsentation im Kurs.
a) haben
b) hat
c) hatte

Part 3. Listening

Listen to the dialogue and answer the questions

Dialogue (audio text):

Andrej: *Hallo Maria, lernst du auch für den Deutschtest morgen?*

Maria: *Ja, ich wiederhole gerade die neuen Wörter. Und du?*

Andrej: *Ich übe noch die Grammatik. Wollen wir später zusammen lernen?*

Maria: *Gute Idee! Wir können uns um 17 Uhr in der Bibliothek treffen.*

Questions:

1. Wofür lernen die Studenten?
2. Was wiederholt Maria?
3. Was übt der zweite Student?
4. Wo wollen sie sich treffen?
5. Wann treffen sie sich?

Part 4. Written communicative task

Write a short message (50–70 words)

Situation:

Ein deutscher Freund besucht bald deine Stadt. Er fragt dich nach guten Orten zum Lernen und Entspannen. Schreibe eine kurze Nachricht und empfehle zwei Orte (z. B. Bibliothek, Café, Park).

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