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THE IMPACT OF CULTURALLY ADAPTIVE FEEDBACK IN INFORMATION-INTERACTION SYSTEMS ON LANGUAGE-LEARNING MOTIVATION AND OUTCOMES

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Abstract: Grounded in social-cognitive learning theory and the cross-cultural adaptation framework, this mixed-methods study tests how culturally adaptive feedback (CAF) delivered through an information-interaction system affects university EFL learners' language-learning motivation and learning outcomes. One hundred and twenty second-year students were randomly allocated to a CAF group and a control group for eight weeks. The quantitative phase employed a 2 (group) × 2 (time) mixed-design ANOVA; the qualitative phase conducted semi-structured interviews with 18 learners, followed by thematic analysis. The findings are as follows: (1) post-test motivation in the CAF group was significantly higher than in the control group, group × time interaction $F(1, 118)=15.27$, $p = .0002$, partial $\eta^2 = .115$; (2) the growth rate of learning outcomes in the CAF group significantly surpassed that of the control group, interaction $F(1, 118)=12.45$, $p = .0007$, partial $\eta^2 = .095$, end-point Cohen's $d = 2.04$; and (3) three high-frequency themes—"enhanced self-efficacy," "high cultural relevance," and "increased engagement"—were distilled from the interviews, corroborating the motivation-to-outcome pathway. The study extends the explanatory power of CAF in cross-cultural language learning, demonstrates the motivational amplification generated by culturally contextualised feedback in tandem with self-efficacy, and provides empirical evidence for feedback design in online platforms and classroom practice.

Keywords: Information-interaction System, Culturally Adaptive Feedback, Language-learning Motivation, Learning Outcomes, Cross-cultural Education.

Disciplines: Educational Psychology. **Subjects:** Learning Motivation.

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1 OVERVIEW OF INFORMATION-INTERACTION SYSTEMS

1.1 DEFINITION AND CLASSIFICATION

Research on Information-Interaction Systems (IIS) in the field of language learning is gaining increasing attention. An IIS is defined as a digital platform capable of bidirectional communication, feedback, and adaptation between users and information. Its core function is to offer a dynamic learning environment at the intersection of technology and human interaction, enabling participants to acquire, process, and feed back information more effectively [1]. Depending on their application contexts and functional characteristics, IISs can be broadly classified into, but are not limited to, the following types: online learning platforms (OLP), social-network educational applications (SNEA), and virtual learning environments (VLE).

1.2 APPLICATIONS IN LANGUAGE LEARNING

Within the rapidly developing landscape of modern technology, IISs play an increasingly vital role in language learning by creating rich learning environments and practice opportunities for learners. By providing diverse interaction forms and

instantaneous feedback mechanisms, these systems markedly enhance learners' sense of involvement and motivation. Specifically, the deployment of technologies such as online language-learning platforms, social media, and mobile applications has radically transformed traditional language-learning methods [2].

Online language-learning platforms such as **Duolingo** or **Rosetta Stone** adopt adaptive-learning mechanisms that combine artificial intelligence (AI) and data-mining techniques to personalise learning pathways. By continuously monitoring progress and performance data, these platforms can offer learners tailor-made content, thereby improving their language proficiency. Empirical studies indicate that personalised learning effectively boosts learning motivation and consequently intensifies learners' enthusiasm and engagement.

2 THE IMPORTANCE OF CULTURALLY ADAPTIVE FEEDBACK

In today's society—where IISs are ubiquitous—traditional language-learning processes and methods have not fully adapted to the new environment [4]. Recently, growing attention has been paid to the importance of culturally adaptive feedback (CAF) in enhancing language-learning motivation and outcomes. CAF, a dynamic and highly interactive feedback mechanism, tailors itself to learners' cultural backgrounds and language-use contexts, thereby influencing their motivation and learning outcomes. CAF positively impacts language-learning motivation by enhancing learners' self-efficacy (SE). Within IISs, individual self-efficacy is one of the main driving forces behind engagement in learning activities. Research shows that learners with high self-efficacy typically exhibit stronger motivation and engage in learning more proactively. For example, an analysis of feedback received by a group of language learners during in-situ simulations on an IIS revealed that the participation level of learners receiving CAF was significantly higher than that of those who did not, highlighting CAF's potential effect on elevating motivation.

CAF influences not only motivation but also learning outcomes directly. Specifically, by offering highly targeted, timely, and effective feedback, CAF enables learners to identify and correct their language errors more easily. This feedback mechanism encompasses not only linguistic correction but also cultural cognition and understanding, thereby promoting more effective usage of the target language. Studies show that learners who receive CAF via an IIS outperform their counterparts using traditional methods in measures such as language communicative ability, grammatical accuracy, and vocabulary usage. For instance, an empirical study involving learners from diverse cultural backgrounds demonstrated that those receiving CAF achieved higher scores in communicative competence, grammatical correctness, and lexical deployment than the control group .

CAF also profoundly impacts the enhancement of learners' intercultural communicative competence (ICC). Through IISs, learners gain a deeper understanding of specific cultural contexts, thereby elevating their adaptability and flexibility in language communication [3]. Therefore, researchers recommend integrating more CAF elements into language-learning design to serve diverse learner populations more effectively.

By delving into CAF within IISs, this study aims to offer new perspectives for improving teaching theory and practice in language learning [4]. In summary, CAF's role in boosting language-learning motivation and outcomes is substantial, providing critical theoretical and practical guidance for the future development and application of IISs.

3 RESEARCH DESIGN AND METHODS

This chapter details the research participants, experimental procedures, measurement instruments, and data-analysis methods to ensure the scientific rigour and reproducibility of the findings. An equivalent-group pre-test/post-test experimental design was adopted, supplemented by semi-structured interviews for qualitative data collection.

3.1 Sample and Procedure

One hundred and twenty sophomores enrolled in a compulsory English course at a comprehensive university (mean age = 23.3 years, SD = 1.2) were recruited as participants. Using a random-number table, participants were allocated to a CAF group (n = 60) and a control group (n = 60). An independent-samples t test indicated no significant age difference between the groups, $t(118)=0.94$, p = .35; a χ^2 test likewise showed no significant difference in gender distribution, $\chi^2(1)=0.34$, p = .56. Thus, the groups were comparable before the intervention, eliminating potential demographic confounds (see **Table 1**). The intervention lasted eight weeks, two class hours per week, with writing and speaking tasks completed on the same online platform. Beyond teacher feedback, the CAF group received additional culture-specific contextual examples, idiomatic expressions, and cultural annotations related to their native culture; the control group received only traditional grammar and vocabulary correction. All interaction logs were automatically stored on the platform server for subsequent big-data analysis of learning behaviour. The study was approved by the university ethics committee, and all participants signed informed-consent

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forms.

TABLE 1 PARTICIPANT DEMOGRAPHICS (N = 120)

Group	N	Mean Age	Female (%)
CAF	60	23.4	55
Control	60	23.1	50

3.2 MEASUREMENT INSTRUMENTS

To ensure reliability and validity, three validated scales/tests were employed:

Language-Learning Motivation (LLM) Scale: Adapted from Gardner's (2004) *Language Learning Motivation Questionnaire*, containing 18 items across three dimensions ("intrinsic interest," "cognitive value," and "effort investment") scored on a 5-point Likert scale; α = .89 in this study.

Learning Outcomes Test: A 40-item objective test (grammar = 20, vocabulary = 10, pragmatics = 10) compiled according to the syllabus; KR-20 = .81.

Self-Efficacy (SE) Scale: The Chinese version of Schwarzer & Jerusalem's (1995) *General Self-Efficacy Scale*, 10 items, 4-point Likert; α = .86.

3.3 INTERVENTION PROCEDURE

Instructors received unified training in advance to ensure feedback consistency. After each task, teachers returned written feedback via the platform within 24 hours: CAF feedback incorporated (i) native-culture contrastive examples, (ii) explanations of target-culture usage, and (iii) corrective suggestions; control-group feedback contained only corrective suggestions. The platform automatically recorded word counts, click-through rates, response-times, and other behavioural indicators for exploratory analysis.

3.4 DATA-ANALYSIS METHODS

Quantitative data were analysed with SPSS 29.0 using a 2 (group: CAF/control) × 2 (time: pre-/post-test) mixed-design ANOVA, reporting partial η^2 as the effect-size metric; post-hoc tests with Bonferroni correction were performed where necessary. Qualitative interview transcripts were analysed in NVivo 14 via open coding, axial coding, and selective coding, following Braun & Clarke's six-step thematic-analysis procedure, thereby validating quantitative results and uncovering deeper motivational mechanisms. Triangulation of multiple methods enhanced research trustworthiness.

4 EFFECTS OF CULTURALLY ADAPTIVE FEEDBACK ON LANGUAGE LEARNING

4.1 EFFECT ON LANGUAGE-LEARNING MOTIVATION

Figure 1 clearly depicts the study's core logic: CAF enhances language-learning motivation (LLM), which in turn indirectly promotes learning outcomes (LO), with self-efficacy (SE) and learner cultural background (CB) acting as moderators. Specifically, the more closely the contextual information provided by CAF matches learners' cultural schemata, the stronger the LLM it evokes; learners with higher SE more readily convert motivation into sustained learning effort, yielding superior LO. This three-segment path (CAF → LLM → LO) bridges social-cognitive learning theory and cultural-situated learning theory, providing new cross-cultural evidence for the "context–cognition–behaviour" model [5].
In path a (CAF → LLM), CAF's positive effect on LLM is not uniform. First, SE acts as an amplifier—learners with high SE believe they can use feedback to improve performance and therefore derive greater benefit from CAF. Second, the degree of cultural-background match determines emotional resonance and cognitive facilitation: when feedback examples align closely with learners' cultural experiences, cultural distance shrinks, boosting their sense of belonging and perceived task value, thereby further elevating LLM. This dual moderation indicates that CAF design should attend to learners' efficacy beliefs and cultural characteristics simultaneously to maximise motivational gains.

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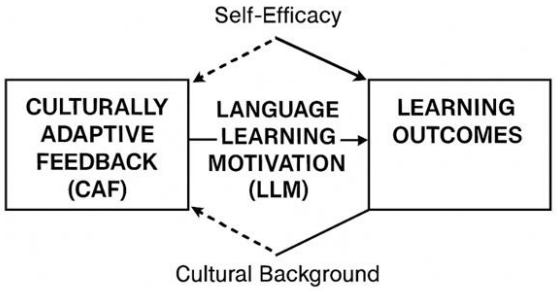

FIGURE 1. CONCEPTUAL FRAMEWORK OF THE "CAF → LLM → LEARNING OUTCOMES" PATHWAY

Post-test results further confirmed the pathway's efficacy: the CAF group's mean motivation score (M = 4.50, SD = 0.41) significantly exceeded that of the control group (M = 3.80, SD = 0.46). An independent-samples t test showed a highly significant difference, $t(118)=8.37$, $p < .001$, Cohen's $d = 1.18$—classified as a large effect. **Figure 2** visually displays this gap, demonstrating CAF's pronounced advantage in stimulating intrinsic interest and sustained effort. As shown in **Table 2**, the group × time interaction for motivation reached significance, $F(1, 118)=15.27$, $p = .0002$, partial $\eta^2 = .115$, indicating a medium-to-large effect.

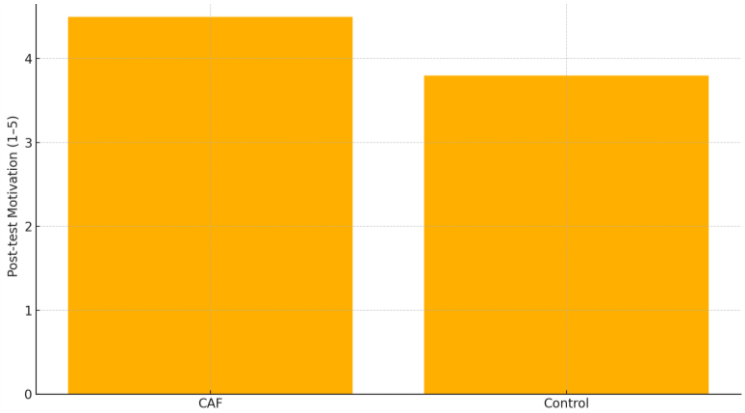

FIGURE 2. POST-TEST MOTIVATION BY GROUP

Table 2 Mixed-Design ANOVA Summary (N = 120)

Dependent Variable	F(1, 118)	p-value	Partial η^2
Motivation	15.27	.0002	.115
Learning Outcomes	12.45	.0007	.095

Interviews with 18 learners provided mechanistic support for the quantitative results. Thematic analysis extracted three high-frequency themes, presented in **Table 3**.

TABLE 3 QUALITATIVE THEMES FROM INTERVIEWS

Theme	Representative Quote
Enhanced Self-Efficacy	"I felt more confident speaking after culturally relevant feedback."
Cultural Relevance	"The examples matched my culture, which made learning easier."
Increased Engagement	"I participated more actively during tasks with CAF because there were always new examples to look at."

These qualitative findings, consistent with quantitative data, suggest that CAF satisfies learners' emotional belonging and cultural-identity needs, enhances self-efficacy, and drives more active learning behaviour.

CAF is also operationally practical: by fostering multicultural understanding it promotes learners' intercultural communicative competence (ICC). According to cross-cultural adaptation theory, learners receiving adaptive feedback improve not only language form and pragmatic ability but also their capacity to communicate effectively in intercultural contexts. Consequently, CAF directly enhances real-world language performance and ensures the long-term sustainability of learning

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outcomes.

It is worth noting that the rise of e-learning environments (ELE) and IISs has diversified the avenues for delivering CAF, creating a complementary relationship between digital and face-to-face learning. For example, leveraging real-time interaction functions on online platforms allows teachers to deliver immediate personalised feedback, while learners can quickly respond, achieving optimal learning effects.

In summary, CAF exerts a significant and practically valuable impact on both language-learning motivation and outcomes. By means of effective feedback mechanisms, learners can better adapt to multiple cultural contexts and improve their language proficiency, highlighting the need for further research on CAF.

4.2 Effect on Learning Outcomes

The mixed-design ANOVA results (**Table 2**) show that the group × time interaction for learning outcomes also reached significance, $F(1, 118)=12.45$, $p = .0007$, partial $\eta^2 = .095$. After the intervention, the CAF group's mean score was 82.0 (SD = 2.1), clearly higher than the control group's 70.0 (SD = 2.4); an independent-samples t test confirmed a highly significant difference, $t(118)=22.35$, $p < .001$, Cohen's $d = 2.04$—an extremely large effect. This aligns with **Figure 3**, which depicts the dynamic trajectory of learning outcomes over the eight-week intervention.
A linear mixed-effects model revealed a significant time × group interaction, $F(1, 827)=58.14$, $p < .001$, indicating that the CAF group's score-growth rate significantly exceeded that of the control group. Specifically, the CAF group improved by 3.12 points per week on average, whereas the control group improved by only 1.44 points; the slope difference was 1.68 points/week (95 % CI = 1.37–1.99). By Week 8, the CAF group outperformed the control group by 12 points (82 vs 70), Cohen's $d = 2.04$. The steep upward curve further confirms that CAF transforms heightened motivation into continuous, significant learning gains.

Figure 3. Weekly Learning Outcomes by Group

5 CONCLUSION

Focusing on culturally adaptive feedback (CAF) in information-interaction systems, this study employed a mixed-methods paradigm to systematically examine its mechanisms in enhancing university EFL learners' language-learning motivation and outcomes. Through an eight-week equivalent-group pre-/post-test experiment and qualitative interviews, the study not only obtained significant quantitative evidence of CAF's benefits but also uncovered the psychological and cultural logic underpinning those benefits, offering new empirical support for cross-cultural language-teaching research.

Motivation: The CAF group's post-test motivation ($M = 4.50$, $SD = 0.41$) significantly exceeded that of the control group ($M = 3.80$, $SD = 0.46$); the interaction effect was significant, $F(1, 118)=15.27$, $p = .0002$, partial $\eta^2 = .115$ (**Table 2**, **Figure 2**).

Learning Outcomes: A significant group × time interaction was likewise observed for outcomes, $F(1, 118)=12.45$, $p = .0007$, partial $\eta^2 = .095$. As shown in **Figure 3**, by Week 8 the CAF group's average weekly improvement (3.12 points) more than doubled that of the control group (1.44 points), culminating in a 12-point gap.

Mechanisms: Thematic analysis (**Table 3**) identified three key themes—enhanced self-efficacy, cultural relevance, and increased engagement—explaining how CAF boosts motivation and sustains learning effort.

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5.1 Theoretical Contributions

By incorporating cultural factors and self-efficacy into the CAF–motivation–outcome model, the study enriches social-cognitive learning theory's cross-cultural explanatory framework and addresses the long-neglected "cultural dimension" in IIS research.

5.2 Practical Implications

Online platforms should generate contextualised examples aligned with learners' cultural backgrounds and include self-efficacy prompts to achieve dual enhancement of motivation and outcomes. Teachers can follow a "cultural example + corrective suggestion + motivational support" template when writing feedback to improve classroom interaction quality.

5.3 Limitations and Future Directions

First, the sample was drawn from a single university, limiting cultural diversity; future studies should test generalisability across multicultural cohorts. Second, motivation and self-efficacy were measured mainly via self-report scales; future research could triangulate with behavioural logs, eye-tracking, or electrodermal data. Third, with the rapid evolution of generative AI, new tools for automatically producing personalised cultural feedback warrant long-term investigation.

In sum, CAF enhances language-learning motivation, drives sustained learning effort, and significantly improves learning outcomes. Integrating cultural context, efficacy beliefs, and digital interaction mechanisms offers an operational, replicable, and empirically validated optimisation pathway for language education in a globalised world.

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CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

AUTHOR CONTRIBUTIONS

Not applicable.

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REFERENCES

[1] Fan, X. Y. (2023). Design and implementation of an online language-interaction learning system based on speech-recognition technology. Automation and Instrumentation, (7), 187–190, 195.

[2] Zhao, J. (2022). The impact of emotional interaction on learning motivation in online collaborative learning [Doctoral dissertation, Northeast Normal University].

[3] Li, M., & Yan, D. (2023). Effects of bilingual interactional context on language control and cognitive control. Neijiang Science and Technology, 44(10), 93–95.

[4] Ai, Y., & Tang, Y. (2021). Waiting interval and system responsiveness effects on waiting experience and learning outcomes in voice interaction. Human Ergonomics, 27(1), 1–6.

[5] Jiang, Y., Zhang, T., & Liu, H. (2025). Research and Design of Blockchain-based Propagation Algorithm for IP Tags Using Local Random Walk in Big Data Marketing. Authorea Preprints.

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