

ORIGINAL ARTICLE

The Effects of Sustained Duolingo Use on French Learners' Attitude, Interest, and Perceived Knowledge

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Abstract

Mobile-assisted language learning can extend French instruction beyond limited university contact hours. This study investigated the contribution of a 30-day Duolingo streak, used alongside weekly classes, to Iranian undergraduates' attitude toward learning French, interest in French, and perceived knowledge of the language. Drawing on the Seamless Learning Framework, the intervention connected formal classroom instruction with informal out-of-class practice. At the end of the semester, 64 students at one Iranian university completed a retrospective questionnaire combining current ratings with pre-intervention ratings on the same three constructs. The analyses revealed statistically significant improvement with large effect sizes on all three self-reported measures. Attitude toward learning French shifted from a slightly negative orientation to a markedly positive one. Perceived knowledge increased considerably, and interest in French also rose, suggesting that sustained gamified practice can heighten learners' affinity for the language. The findings imply that a relatively brief but uninterrupted period of daily Duolingo use can strengthen learners' sense of what they know and foster a more favorable orientation toward French. In programs with few weekly hours, a supervised streak may serve as a practical, low-cost complement to classroom instruction.

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Introduction

Undergraduate students majoring in English Translation in Iran are required to complete several French language courses as part of their degree program. The present researcher has observed that many of these students develop negative attitudes toward French. They often complete the courses retaining little of the content and tend to memorize material merely to pass examinations. This approach typically leads to poor long-term retention because students tend to forget most of what they learned shortly after the course ends.

One way to address the problem of limited practice and poor retention is through mobile-assisted language learning tools. Such applications have emerged as a promising solution to the constraints of limited classroom time, enabling learners to engage in short, frequent practice sessions at their convenience and supporting consistent exposure to the target language beyond traditional lectures.

To ground the investigation theoretically, the present study adopts the Seamless Learning Framework proposed by Wong and Looi (۲۰۱۱). This framework conceptualizes learning as a continuous process that occurs across multiple contexts, bridging formal classroom instruction with informal, self-directed activities. It emphasizes the role of mobile technologies in creating fluid transitions across learning spaces and time frames, allowing learners to maintain momentum regardless of location or schedule. Within this perspective, mobile applications can serve as essential mediators that enable learners to connect fragmented learning experiences into a cohesive whole.

While the Seamless Learning Framework highlights the potential of mobile technologies to create continuous learning experiences, the effectiveness of such tools depends heavily on their alignment with learners' linguistic backgrounds and instructional realities. Despite growing interest in gamified mobile applications for language learning, limited empirical research has examined the use of tools such as Duolingo as a mandatory component in Iranian university French courses.

The objective of this study was to determine whether statistically significant differences existed in students' perceived French knowledge, interest in the French language, and attitudes toward learning French before and after using Duolingo. The study was guided by the following research questions:

۱. Is there a significant difference between students' perceived French knowledge before and after using Duolingo?
۲. Is there a significant difference between students' interest in the French language before and after using Duolingo?
۳. Is there a significant difference between students' attitudes toward learning French before and after using Duolingo?

The remainder of this article is organized as follows. Section ۲ reviews the relevant literature on mobile-assisted language learning, gamification in education, and the role of attitude, interest, and perceived knowledge in second language acquisition. Section ۳ describes the study's methodology, including participant characteristics, the instructional context, instrument design, and data collection and analysis procedures. Section ۴ presents the quantitative findings for each of the three dependent variables and situates them within the existing empirical literature. Section ۵ draws conclusions from the findings,

acknowledges the limitations of the study, and offers recommendations for future research and pedagogical practice.

Literature Review / Background

Mobile-assisted language learning (MALL) has emerged as a prominent area of research, with numerous studies examining the effectiveness of digital tools in supporting second-language acquisition. Meta-analyses consistently demonstrate moderate positive effects. Sung et al. (۲۰۱۵) reported an overall effect size of ۰.۵۵ across MALL interventions, highlighting gains in vocabulary and listening skills. Burston (۲۰۱۵) reviewed two decades of MALL projects and found that most experimental studies reported statistically significant learning outcomes, though many suffered from small sample sizes. In a later comprehensive meta-analysis covering ۱۹۹۴-۲۰۱۹, Burston and Giannakou (۲۰۲۲) confirmed sustained benefits in receptive skills when mobile tools supplemented classroom instruction. Broader systematic reviews reinforce these findings. Mihaylova et al. (۲۰۲۲) synthesized evidence from MALL applications and noted consistent improvements in learner motivation and achievement when usage was regular.

Ishaq et al. (۲۰۲۱) similarly concluded that gamified mobile applications enhance persistence and engagement across more than sixty studies. Deterding et al. (۲۰۱۱) provided the foundational definition of gamification as the use of game-design elements in non-game contexts, which underpins many language-learning applications. Dehghanzadeh et al. (۲۰۲۱) conducted a systematic review of gamification in English-language learning and identified positive effects on motivation and retention when elements such as streaks and points were integrated thoughtfully. These findings raise questions about how mobile tools can be theoretically positioned to connect structured classroom practice with learners' self-directed use across time and settings.

Seamless learning frameworks offer a theoretical lens for understanding how mobile tools bridge formal and informal contexts. Wong and Looi (۲۰۱۱) articulated the core principles of mobile-assisted seamless learning, emphasizing continuity across time, location, and social settings. Their earlier empirical work (Wong & Looi, ۲۰۱۰) demonstrated that learners who created authentic content on mobile devices showed improved vocabulary retention through collaborative meaning-making. Several empirical studies have applied Wong and Looi's (۲۰۱۱) seamless learning framework to examine continuity between formal and informal language learning. Wong et al. (۲۰۱۵) drew on the framework to investigate how artifact creation and social interaction processes can enculturate seamless language learning, showing sustained language use beyond the classroom. Looi et al. (۲۰۱۹) synthesized multiple projects employing the seamless learning perspective, with studies consistently demonstrating strengthened language development through cross-

context interaction and personal device use. Kukulska-Hulme (2020) has drawn on the same principles to illustrate how mobile technologies can bridge in-class and out-of-class learning when pedagogical designs explicitly address these transitions. This body of work therefore supplies a relevant theoretical and empirical foundation for examining interventions that seek to extend language practice beyond limited weekly class time.

Empirical research on Duolingo suggests it can support measurable language gains, though the evidence is bounded by important contextual constraints. Early work by Vesselinov and Grego (2012) established a basic proficiency benchmark, and subsequent studies extended this finding to grammar and vocabulary, with Loewen et al. (2019) documenting moderate positive correlations between time on task and linguistic gains in a Turkish learning context. More ambitious outcome claims followed: Jiang et al. (2021) found that sustained practice could bring beginning-level learners of Spanish and French to ACTFL Intermediate Low reading proficiency, while Smith et al. (2022) identified session completion and accuracy rates as meaningful predictors of receptive and productive growth over a three-month independent learning period. Yet these encouraging outcomes exist alongside persistent methodological concerns. Shortt et al.'s (2022) systematic review of the literature from 2012 to 2020 found that most Duolingo studies are quantitative and design-focused, with limited attention to long-term proficiency trajectories. At the pedagogical level, Munday (2016) argued that the application functions best as a supplement to formal instruction rather than a standalone solution—a position that the mixed motivational responses observed by Loewen et al. (2019), including frustration with repetitive content, lend further support to. These findings suggest that Duolingo's effectiveness is not uniform but conditioned by how it is integrated into a broader instructional context.

Taken together, the studies reviewed above establish a productive but incomplete picture of MALL's potential in second language learning contexts. While the evidence broadly supports the role of mobile applications in promoting learner engagement and vocabulary development, several recurring methodological limitations constrain the generalizability of existing findings. Many studies rely on short intervention windows, self-selected samples, or self-report instruments with limited validation, making it difficult to isolate the effects of the application from confounding motivational variables such as novelty bias or voluntary participation. Moreover, the literature has yet to reach consensus on how affective constructs (namely attitude, interest, and perceived knowledge) interact with one another over sustained engagement, particularly when the application in question is gamified. The present study addresses these gaps by examining the effects of a 30-day, instructor-integrated Duolingo intervention on French language learners' attitude, interest, and self-reported knowledge within a controlled university setting, contributing to a more nuanced understanding of long-term MALL use in formal instructional contexts.

Methodology

Research Design

The present study adopted a descriptive research design employing retrospective self-report. Rather than administering separate instruments at two time points, a single questionnaire was distributed at the end of the semester, asking participants to rate their current status on each construct and to recall their status on the same constructs prior to beginning the Duolingo streak. This retrospective approach was adopted because the three French classes were already using Duolingo as a compulsory course component when the study was conceived, making prospective baseline measurement infeasible. The design aligns with Creswell and Creswell's (2018) characterization of descriptive quantitative research as research whose primary aim is to describe and compare participants' characteristics or responses on a given phenomenon. Consistent with this aim, the present study sought to describe and compare self-reported French knowledge, interest in French, and attitude toward learning French before and after the intervention. The design does not include a control group or random assignment, so observed changes cannot be causally attributed to Duolingo independent of concurrent classroom instruction or other influences; this constraint is addressed in the limitations.

Participants

A total of 64 undergraduate students majoring in English Translation participated in the study. They were enrolled across three French language courses: 16 students in French 1, 21 in French 2, and 27 in French 3 (introductory through lower-intermediate level, respectively). All participants attended one weekly French class per semester and were required to complete a 30-day Duolingo streak as part of their coursework. No additional demographic data (age, gender) were collected.

Convenience sampling was used because the three intact classes were already using Duolingo as a compulsory course component when the study was conceived (see Section 3.1). Cohen et al. (2018) define convenience sampling as the selection of participants who are readily available and willing to take part at the time the study is conducted. Although this approach offers practical advantages in time and cost, it does not involve random selection, which limits the representativeness of the sample and the generalizability of the findings beyond the specific group studied.

Duolingo

Duolingo was selected for this study because it offers a comprehensive and pedagogically sound platform for language learning, delivering short, interactive lessons that focus on vocabulary, grammar, listening, and speaking skills. Its gamified structure (including points, levels, and daily reminders) provides built-in reinforcement for regular practice. Participants were required to complete the French-from-English course on the mobile application, beginning at a level corresponding to their enrolled class (French 1, 2, or 3).

The intervention required participants to maintain a 30-day streak. A “streak” is defined by Duolingo as completing at least one lesson per day for consecutive days; failure to complete a lesson on any given day resets the streak to zero. The instructor monitored streak progress through periodic in-class checks and end-of-semester screenshots submitted by participants. All 64 participants who completed the final questionnaire had maintained the full 30-day streak by the end of the semester.

The streak requirement was imposed to ensure consistent daily engagement with French outside the single weekly classroom session. The app’s gamified features provided additional reinforcement for daily practice, though the study did not measure which specific app features, such as spaced repetition, immediate feedback, or speaking exercises, contributed to the observed changes in attitude, interest, and perceived knowledge.

Instrument

Data were collected using a researcher-developed questionnaire. The questionnaire consisted of six items organized into two parallel sections, each addressing the three constructs specified in the research questions: perceived French knowledge, interest in the French language, and attitude toward learning French. The first section asked participants to rate their status on each construct at the beginning of the semester, before starting the Duolingo streak. The second section asked the same three questions with reference to their status at the time of questionnaire completion, after the 30-day streak. The full list of items appears in the Appendix.

Each item was rated on a 5-point scale ranging from 1 (lowest) to 5 (highest). Following common practice in applied linguistics research, responses were treated as interval-level data to permit parametric analysis. Although Likert-type scales are ordinal in nature, this treatment is widely used when scales have sufficient points and distributions approximate normality (Norman, 2006). Content validity was established through alignment with the three constructs defined in the research questions; no formal pilot or external

expert review was conducted prior to administration. Reliability analysis yielded a Cronbach's alpha of 0.84, indicating acceptable internal consistency.

Data collection and Analysis

At the beginning of the semester in 2020, the instructor informed all students enrolled in the three French courses about the mandatory integration of Duolingo as a required component of their coursework. Participants were told that maintaining a 30-day streak was obligatory and that marks were allocated to this assignment. The questionnaire was administered electronically via Google Forms at the end of the semester, allowing for convenient data collection and straightforward export for analysis.

All responses were imported into IBM SPSS Statistics version 27 for quantitative analysis. Reliability testing was conducted first to evaluate the internal consistency of the instrument. Descriptive statistics were then generated to examine response patterns, followed by normality tests to assess variable distributions prior to inferential analysis. Finally, paired-samples t-tests were run to determine whether statistically significant differences existed between students' self-reported pre-Duolingo and post-Duolingo scores on perceived French knowledge, interest in French, and attitudes toward learning French.

Results and Discussions

This section reports the quantitative findings for each of the three dependent variables examined in the study, followed by a discussion that situates each finding within the relevant empirical literature. The section proceeds in three parts. First, the effects of the Duolingo intervention on participants' self-reported French knowledge are examined. Second, changes in learners' interest in French are analyzed. Third, the results about attitudes toward learning French are presented. Each subsection reports descriptive statistics, the outcomes of the appropriate inferential test, and effect size estimates, before interpreting the findings in relation to prior Duolingo research.

Table 1. Descriptive statistics for students' French knowledge

	Minimum	Maximum	Mean	Standard Deviation
Before Duolingo	1	9	3.20	2.29
After Duolingo	2	10	5.77	2.10

Table 1 presents the descriptive statistics for students’ perceived French knowledge before and after the Duolingo intervention. The minimum score increased from 1 to 3, the maximum from 9 to 10, and the mean from 3.20 ($SD = 2.29$) to 6.77 ($SD = 2.10$). The slight decrease in standard deviation suggests somewhat greater consistency in responses post-intervention. Prior to inferential analysis, the assumptions of the paired-samples t-test were examined; both the Shapiro–Wilk and Kolmogorov–Smirnov tests were non-significant, indicating that the normality assumption was tenable. A paired-samples t-test was therefore conducted to determine whether the observed increase in mean scores was statistically significant.

Table 2. Paired-samples t-test for students’ French knowledge

	Mean difference	t	p	Cohen’s d
Before Duolingo - After Duolingo	-3.57	-13.31	<.001	-1.77

Table 2 presents the results of the paired-samples t-test for students’ perceived French knowledge. The analysis revealed a statistically significant increase following the Duolingo intervention, with a mean difference of 3.57 points, $t(63) = 13.31, p < .001$. The effect size was large (Cohen’s $d = 1.77$), indicating a substantial improvement in self-reported knowledge after the 10-day streak. The negative signs reflect the direction of the subtraction (pre – post), confirming that scores increased over the intervention period.

The significant rise from 3.20 to 6.77 suggests the intervention meaningfully supplemented these English Translation majors’ once-weekly classes. Given the limited formal contact hours, daily mobile practice may have provided the continuity needed to foster a stronger sense of progress — consistent with the seamless learning framework’s emphasis on bridging formal and informal learning contexts (Wong & Looi, 2011). Although the scores reflect perceived rather than tested proficiency, the large effect size indicates that students reported substantial gains, a finding worth noting given their initially low self-assessments.

These findings align with studies documenting language gains from Duolingo. Jiang et al. (2021) found that adult beginners who completed beginning-level French or Spanish courses reached Intermediate Low in reading and Novice High in listening — levels comparable to university students after four semesters. Fathi et al. (2024) reported a significant effect of out-of-class Duolingo use on French achievement among Iranian FFL undergraduates. Smith et al. (2024) reported significant gains in receptive and productive Spanish knowledge after approximately three months of independent use, and Loewen et al. (2019) observed improvement on Turkish language measures, with study time positively related to gains. Unlike

those studies, which assessed tested proficiency or objective achievement, the present result reflects a large rise in perceived knowledge among students who were simultaneously attending weekly classes. The convergence suggests that sustained Duolingo use can support learners' sense of linguistic progress regardless of whether gains are measured objectively or self-reported.

Table 3. Descriptive statistics for students' interest in French

	Minimum	Maximum	Mean	Standard Deviation
Before Duolingo	1	10	5.08	3.20
After Duolingo	1	10	7.09	2.22

Descriptive statistics for interest in French (Table 3) showed a rise in mean scores, from 5.08 ($SD = 3.20$) before the intervention to 7.09 ($SD = 2.22$) afterward. The reduction in standard deviation suggests greater consistency in participants' ratings post-intervention. Prior to inferential analysis, both the Shapiro–Wilk and Kolmogorov–Smirnov tests were conducted; results were consistent with the assumption of normality, supporting the use of a paired-samples t-test to evaluate pre–post differences.

Table 4. Paired-samples t-test for students' interest in French

	Mean difference	t	p	Cohen's d
Before Duolingo - After Duolingo	-2.01	-7.81	<.001	-.97

The paired-samples t-test in Table 4 revealed a statistically significant increase in students' interest in French after the 30-day Duolingo streak (mean difference = 2.01, $t(33) = 7.81$, $p < .001$), with a large effect size (Cohen's $d = .97$).

The significant increase suggests that students developed a stronger interest in and enjoyment of French over the course of the intervention. Within Wong and Looi's (2011) seamless learning framework, the app's daily mobile practice appears to have bridged formal course requirements with informal, self-paced engagement, potentially reinforcing students' affective orientation toward the language. These findings suggest that sustained mobile-assisted practice may support positive shifts in learners' interest in the target language.

These findings align with studies documenting affective gains following sustained Duolingo use. Loewen et al. (2019) observed that participants' overall positive emotional engagement with Turkish increased alongside proficiency gains, despite fluctuations in motivation and persistence. Smith et al. (2024) similarly reported that self-reported enjoyment of learning Spanish correlated positively with lesson completion and measurable language growth. Xu and Liu (2020) likewise found that Duolingo users reported higher enjoyment than a control group. Unlike those studies, which largely tracked enjoyment as a secondary variable alongside tested gains, the present study placed interest at the center of inquiry and found a large self-reported rise across the intervention period.

Table 9. Descriptive statistics for students' attitudes toward learning French

	Minimum	Maximum	Mean	Standard Deviation
Before Duolingo	1	10	4.89	2.77
After Duolingo	1	10	7.47	2.10

Table 9 presents descriptive statistics for students' attitudes toward French before and after using Duolingo. Before the intervention, scores ranged from 1 to 10, with a mean of 4.89 ($SD = 2.77$). After the intervention, the range was unchanged, while the mean rose to 7.47 ($SD = 2.10$). The 2.58-point increase in mean score was accompanied by reduced variability, indicating that attitudes became more positive and more homogeneous across the group. Prior to inferential analysis, Shapiro–Wilk and Kolmogorov–Smirnov tests were applied to the difference scores; results were consistent with the normality assumption, supporting the use of a paired-samples t-test to evaluate pre–post differences.

Table 10. Paired-samples t-test for students' attitudes toward learning French

	Mean difference	t	p	Cohen's d
Before Duolingo - After Duolingo	-2.57	-7.39	<.001	-0.92

The paired-samples t-test revealed a statistically significant increase in students' attitudes toward French, $t(63) = 7.39$, $p < .001$, mean difference = 2.57, with a large effect size (Cohen's $d = 0.92$).

The rise from a mean of 4.89 to 7.47 represents a meaningful shift from below-midpoint ratings—suggesting a reserved or ambivalent orientation—to ratings well above the midpoint. Within Wong and

Looi's (2011) seamless learning framework, the app's daily mobile practice may have bridged formal course requirements and informal engagement, potentially contributing to a more favorable orientation toward the language. Students who develop more positive attitudes toward learning a language are theoretically more likely to invest effort and persist with practice (Ramage, 1990).

These findings are consistent with Zeng and Fisher (2024), who found that sustained out-of-class Duolingo use significantly boosted Chinese junior high school students' intrinsic motivation for learning English. Du (2026) similarly reported that Duolingo engagement frequency among Chinese EFL undergraduates positively predicted intrinsic motivation, with usage frequency exerting an indirect effect through motivational processes. While those studies focused on intrinsic motivation and the present study measured attitudes directly, the convergence suggests that sustained mobile-assisted practice can support positive affective shifts toward language learning across varied contexts and populations, consistent with the seamless learning framework's emphasis on connecting formal and informal learning to strengthen affective engagement.

Conclusions

This study examined the effects of a 30-day Duolingo streak on 64 Iranian university students enrolled in weekly French courses. Paired-samples t-tests revealed statistically significant pre-post improvements with large effect sizes on all three self-reported outcomes. Perceived knowledge of French increased substantially, with students reporting greater familiarity with the language after two months of sustained daily use. Interest in French also rose, suggesting that consistent informal engagement can increase learners' affinity for the language. Attitudes toward learning French shifted from below-midpoint ratings, indicating a reserved or ambivalent orientation, to well above-midpoint ratings, suggesting that informal, gamified practice can foster a more favorable stance toward French as a subject of study. Taken together, the findings indicate that a relatively short but uninterrupted period of mobile-assisted practice, added to existing classroom instruction, can strengthen learners' sense of what they know and support a more positive affective orientation toward the target language.

Several limitations should be noted. First, the single-group design without a control group means that observed changes cannot be attributed solely to Duolingo; gains may reflect maturation, instruction, or other concurrent influences. Second, all outcomes relied on self-report; no objective proficiency assessment was administered to corroborate participants' perceptions. Third, the sample comprised 64 students from a single institution over a 30-day period, which limits generalizability to broader populations or different instructional contexts. Fourth, because the streak was a graded course requirement and all enrolled students

completed it, the sample may overrepresent more motivated or digitally practiced learners, making it difficult to determine how representative the findings are of less compliant or less motivated students. Fifth, the researcher simultaneously served as course instructor; students completing a questionnaire administered by their own instructor may have responded in socially desirable ways, overstating positive attitudes or perceived gains. Sixth, although streak compliance was monitored through in-class checks and submitted screenshots, these measures cannot verify the quality or depth of daily engagement beyond streak maintenance.

Despite these constraints, the findings carry several implications for French instruction in higher education. A structured period of daily Duolingo use can function as a complement to weekly classes rather than a substitute for them; when informal mobile practice is aligned with classroom instruction, learners may develop a stronger sense of progress and a more favorable orientation toward French. The results support seamless learning designs in which formal instruction and out-of-class app use are deliberately integrated: instructors can set a time-bounded streak, connect app content to course topics, and treat daily practice as part of the broader learning ecology. Because attitude and interest improved alongside perceived knowledge, programs that rely on limited contact hours may benefit from adding a low-cost gamified mobile component that sustains daily contact with the language between sessions. Institutions seeking to strengthen beginner French without expanding timetable hours can therefore consider a supervised Duolingo streak as a practical extension of classroom learning.

Future research should address the constraints of the present design. Comparative studies with control or comparison groups would help isolate Duolingo's contribution from classroom instruction and the motivational pressure of a graded streak requirement. Subsequent work should also include objective measures of French proficiency, covering both receptive and productive skills, so that perceived knowledge can be interpreted alongside demonstrated ability. Larger and more diverse samples drawn from multiple institutions and proficiency levels would strengthen claims beyond a single Iranian university cohort. Longer interventions with delayed follow-up are needed to determine whether gains in attitude, interest, and perceived knowledge persist once the streak ends. Mixed-methods designs could further illuminate how learners move between formal classes and informal app use, and which features of Duolingo (such as gamification elements, speaking practice, or daily reminders) most clearly account for affective change. Studies that manipulate the degree of pedagogical integration between app content and course material, and comparisons with other mobile applications, would also clarify the conditions under which out-of-class MALL is most effective for beginner French in higher education.

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Appendix: Questionnaire Items

۱. به میزان دانش دانش فرانسوی خود، قبل از آشنایی با دوولینگو، از ۱ تا ۱۰ نمره دهید.
۲. قبل از آشنایی با دوولینگو، چقدر به زبان فرانسوی علاقه داشتید؟ از ۱ تا ۱۰ نمره دهید (۱ به معنای خیلی کم، و ۱۰ خیلی زیاد است).
۳. قبل از آشنایی با دوولینگو، دیدگاه شما به یادگیری فرانسوی چطور بود؟ از ۱ تا ۱۰ نمره دهید (۱ به معنای خیلی منفی، و ۱۰ خیلی مثبت است).
۴. به میزان دانش کنونی خود در فرانسوی، از ۱ تا ۱۰ نمره دهید.
۵. در حال حاضر، چقدر به زبان فرانسوی علاقه‌مند هستید؟ از ۱ تا ۱۰ نمره دهید (۱ به معنای خیلی کم، و ۱۰ خیلی زیاد است).
۶. در حال حاضر، دیدگاه شما نسبت به یادگیری فرانسوی چطور است؟ از ۱ تا ۱۰ نمره دهید (۱ به معنای خیلی منفی، و ۱۰ خیلی مثبت است).