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Deep Learning of Beginner-Level French Language Using the Duolingo Application at SMA Negeri 2 Kudus

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ABSTRACT

Learning applications can serve as an additional medium to foster students' interest in learning and practicing French, as seen in the Duolingo app. Through its exercises, students learn independently and get used to learning while practicing French. This learning concept is part of the deep learning approach, which fosters active student involvement throughout the learning process. Thus, we conducted the study to test its effectiveness for deep learning of French at the beginner level. A quantitative study using a one-group pretest–posttest design with descriptive statistics is conducted to describe students' initial and final proficiency levels in implementing Duolingo among 20 students in class XI F 9 at SMA Negeri 2 Kudus. The implementation proved effective in improving French language competence in the *Saluer et se présenter* material, with an increase in the average score from 74.00 to 88.67 and a mode score of 93.33 among most students.

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1. INTRODUCTION

In line with current developments, the learning process not only uses media such as books, blackboards, and lecture methods, but also from teachers who teach. To attract students, additional media, such as technology, can be used in learning (Ahmadi, 2018), as digital tools provide interactive elements that increase student motivation and engagement (Haleem et al., 2022). Technology as a learning support prepares students for future challenges, provides opportunities for collaborative learning, encourages independent learning, and fosters positive personalities by increasing students' autonomy in learning (Al Adawiyah et al., 2024). Learning media itself can be defined as a physical or non-physical tool that is intentionally used as an intermediary between educators and students in understanding learning materials to be more effective and efficient (Amka, 2018), so that technological media used in learning even have the advantage of creating a more interactive and personal learning experience for each student. The integration of digital tools provides significant advantages, such as creating a more interactive and personal learning experience for each student (Gikas & Grant, 2013; Shadiev & Yang, 2020), as seen in the use of smartphone applications in learning. Students, especially in high school, are already very close to their daily lives in using smartphones. Most of them use it to communicate, surf social media, and not a few also learn independently through the learning applications on it. Likewise, using French learning applications can enhance their knowledge, including their speaking skills. Most students, especially at the high school level, are beginners in French, so a lot of practice is needed. Learning applications can serve as additional media to foster students' interest in learning and practicing French, providing an engaging and interactive environment that traditional methods may lack (Munday, 2015; Zainuddin et al., 2020), as seen in Duolingo's features.

Duolingo is a free language-learning app with a game-like approach, created by Severin and Natali (Duolingo, 2026). This application is designed to provide a non-boring, engaging learning experience for foreign language learners. The languages that can be learned are not only English but also Spanish, French, South Korean, Italian, German, Portuguese, and more than 9 others (Pale et al., 2024). Duolingo uses a game-like approach with levels, so users must complete each level to progress to the next. Bilmona & Pusparini (2022) stated that the Duolingo application can also be considered a game, though not an entertainment game in general. The games in the Duolingo application are very closely related to education, especially in learning foreign languages. As explained by Aisyah & Hidayatullah (2023), Duolingo is "an educational application that resembles a game, so that users can learn languages in a relaxed and stress-free way. Its flexibility allows users to learn four language skills at once. This application also motivates a level and reward system. In addition, the lessons presented focus on repetitive practice and increasing difficulty, so they do not put too much emphasis on complex grammar." The spaced-repetition approach used in the application algorithm helps move information from short-term to long-term memory (Ajisoko, 2020).

The French learning experience on the Duolingo app covers four language skills: listening (compréhension orale), speaking (production orale), reading (compréhension écrite), and writing (production écrite). These four skills are not presented in separate menus but are interrelated within a single exercise, even though the focus on each skill differs. Through these exercises, students can learn independently and become more familiar with French even outside the classroom. As seen in the French learning program at SMA Negeri 2 Kudus, where teachers seek effective ways to introduce French to students, the Duolingo app has become one of the educators' alternative approaches. This is because French is only taught in grades XI and XII at SMA Negeri 2 Kudus, while students in grade X previously studied a different foreign language, English. Based on observations during teaching practice, the author found that this situation makes it difficult for students to understand French. Through Duolingo, teachers can help students become accustomed to learning and practicing French at the introductory level.

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In general, incorporating games into learning can be seen as educators' efforts to enhance student interaction and collaboration, as game-based environments inherently foster social engagement and collective problem-solving (Plass et al., 2015; Vlachopoulos & Makri, 2017). Both student interaction and collaboration can shape students' critical thinking, fostering either practical cooperation or healthy competition and thereby facilitating a comprehensive understanding of the learning materials (Adawiyah, 2025). This learning concept falls under the category of deep learning, which promotes active student engagement throughout the learning process (Fuadi & Hilmi, 2025). Learning activities on the Duolingo app by students at SMA Negeri 2 Kudus support vocabulary acquisition in French, as Duolingo includes exercises such as guessing French words. Additionally, students can practice their language skills through the listening feature to hear words, the speaking feature to practice pronunciation, and the writing feature to practice writing words (Loewen et al., 2019; Nushi & Eqbali, 2017). Through a series of enjoyable, repetitive activities on Duolingo, such as earning points, unlocking new levels, and competing on leaderboards, students not only memorize vocabulary but also internalize and apply their French knowledge in context. This approach aligns with the characteristics of deep learning, where the focus shifts from passive information transfer to active knowledge construction by students, encouraging them to analyze, synthesize, and evaluate material more meaningfully (Budhiarti et al., 2025). Thus, Duolingo facilitates high-level cognitive engagement, which is the core of deep learning.

According to the Tim Pengembangan Pembelajaran Mendalam (TPPM) Kementerian Pendidikan Dasar dan Menengah Republik Indonesia (n.d.), Deep Learning (DL) is defined as an approach that honors and emphasizes the creation of a learning atmosphere and a mindful, meaningful, and joyful learning process through holistic and integrated mental, emotional, social, and physical engagement. The principles of DL include mindfulness, meaningfulness, and joyfulness. Mindful learning involves learners' full participation in the learning process, enhancing their awareness of their thinking, feelings, and the surrounding environment. Meaningful learning occurs when learners can connect new information with their existing knowledge, ultimately forming a deep understanding of a concept. Joyful learning focuses on positive emotions related to the learning process, including curiosity, enthusiasm, and motivation. DL aims not only to improve academic abilities but also to shape character, creativity, and empathy, so that learners grow into well-rounded individuals aligned with global demands.

In the context of learning that emphasizes deep understanding and active student engagement throughout the learning process, the use of the Duolingo app to learn French at SMA Negeri 2 Kudus is part of the DL. The Duolingo app is used to learn the French material Saluer et se présenter for eleventh-grade students. This material is the second topic taught after the introduction of the French alphabet and numbers. Duolingo is used to practice exercises after students receive explanations of the material through slides. Its implementation is based on the DL learning experience framework, as shown in Figure 1, which includes activities such as understanding, applying, and reflecting. Students independently access Duolingo to complete training modules focused on basic greetings and self-introduction phrases, including gamified exercises such as arranging words, matching images to phrases, and translating simple sentences.

Additionally, they actively use the speaking feature to practice pronunciation of phrases like "Bonjour" or "Je m'appelle," and the listening feature to test their understanding of introductory dialogues. This activity reflects the understanding phase in deep learning, where students do not merely memorize language symbols but build a cognitive foundation through visual and auditory associations available in the app. Next, students enter the application phase through interactive features; they actively construct sentences and practice pronunciation directly, transforming theoretical knowledge from theory into practical skills. The characteristics of deep learning are then perfected through the reflection process. Instant

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feedback provided by Duolingo allows students to quickly identify mistakes and evaluate their understanding independently, both in school and at home. Continuous reflection, combined with vocabulary enrichment through self-learning, fosters students' metacognitive awareness in assessing their learning progress before moving on to the next topic in class. Therefore, the use of Duolingo is not just about digital media but a comprehensive strategy to create meaningful and sustainable learning.

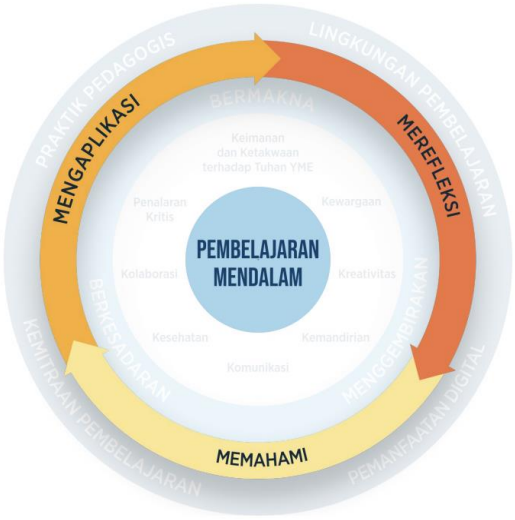

Figure 1. Deep Learning Framework

Learners independently access Duolingo to complete practice modules focusing on basic greeting phrases and self-introductions. These include gamification-based exercises such as word-building, matching images to phrases, and translating simple sentences. They also actively utilize the speaking feature to practice pronouncing words like "*Bonjour*" or "*Je m'appelle*," and the listening feature to test their listening comprehension of introductory dialogues. These activities, as seen in Figure 1, reflect the Understanding phase of immersive learning, where learners go beyond memorizing language symbols to building cognitive foundations through the app's visual and auditory associations. Next, learners enter the Applying phase through these interactive features, actively constructing sentences and practicing pronunciation directly, transforming theoretical knowledge from the slides into concrete, practical skills. These characteristics of immersive learning are then refined through the Reflecting process. Duolingo's instant feedback allows learners to quickly identify errors and independently evaluate their understanding, both at school and at home. This ongoing reflection, coupled with the enrichment of new vocabulary through self-study, fosters students' metacognitive awareness as they assess their learning progress before moving on to the next topic in class. Students consciously monitor their progress through points and levels (gamification), which in turn fosters metacognitive awareness. Students learn to assess their own readiness before moving on to more difficult topics, a core self-regulated learning strategy (Rosell-Aguilar, 2018). Thus, using Duolingo is not merely a digital medium but a comprehensive strategy for creating meaningful and sustainable learning.

Previous studies utilizing the Duolingo app for French learning have also shown that it helps students improve their interest and learning outcomes. According to research by (Kittredge et al., 2024), students can initiate conversations and demonstrate skills at the A1 level of the international CEFR after 4-6 weeks using Duolingo. In addition to French learning, another study by (Bilmona & Pusparini, 2022) concluded that using the Duolingo app is very beneficial for improving students' vocabulary mastery. Using the app in the teaching and learning process makes learning more enjoyable and effective. Students can learn the language for free while

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earning points for correct answers, racing against time, and leveling up. Herlina et al. (2021), in a study to improve the speaking skills of class X students at private high schools in Bekasi using the Duolingo application, concluded that the learning process with the application can improve speaking skills. In the first cycle, with data, 57.14% achieved a score above 75, which is the minimum school completion criterion; in the second cycle, it increased to 71.43%; and in the third cycle, it increased again to 91.43%. The following study is by Loewen et al. (2019), which investigated the learning experience of learning a second language (L2) for one semester using Duolingo. Results showed that nine participants who learned Turkish with Duolingo improved their L2 measurements at the end, as indicated by a positive correlation. Participants generally viewed Duolingo's flexibility and gamification positively. Ananda et al. (2019) also stated that the Duolingo app is highly effective in enhancing students' writing skills and in attracting students to learn French. Students also find learning more engaging and enjoyable because the media used can keep pace with the increasingly modern developments of the current era. The five studies can be summarized as examining the use of the Duolingo application on vocabulary mastery, speaking skills, and writing skills. Meanwhile, the novelty of this study lies in integrating Duolingo into a deep learning framework for beginner-level French learning.

Furthermore, students become more active and confident during vocabulary learning activities. Using Duolingo can serve as an alternative way to integrate technology into French language instruction. Therefore, this study was conducted to examine the effectiveness of using the Duolingo application for beginner-level French learning among students at SMA Negeri 2 Kudus, employing a one-group pretest–posttest design. The research problems are formulated as follows:

1. How is the Duolingo application implemented in beginner-level French learning for students at SMA Negeri 2 Kudus?
2. Is there a significant difference in students' French learning outcomes before and after the use of the Duolingo application?

This study aims to describe the implementation of the Duolingo application for beginner-level French learning and to measure improvements in students' learning outcomes, as indicated by pretest and posttest scores. The findings of this study are expected to demonstrate that the Duolingo application can serve as a mindful, meaningful, and joyful learning medium that effectively supports the acquisition of beginner-level French.

2. METHODS

This is a quantitative study using a one-group pretest–posttest design. The one-group pretest–posttest design involves a single group of students, with learning outcomes measured before (pretest) and after (posttest) the intervention (learning with Duolingo). This approach was chosen to assess the effectiveness of using the Duolingo app as a medium for learning French vocabulary. With this design, changes in learning outcomes are measured by the difference between pretest and posttest scores within the same group. Since there is no control group, any change in scores is assumed to be due to the treatment during the study. The one-group pretest–posttest design is commonly used to test interventions under limited field conditions and can provide an initial indication of the effectiveness of the learning method (Syuhada et al., 2025).

The population of this study consists of all 11th-grade students studying French at SMA Negeri 2 Kudus (classes XI F9, F10, and F11). The school is located at Jalan Ganesha No. 1, Purwosari, Kudus City District, Kudus Regency, Central Java Province. The sample was selected using a census sampling technique from class XI F9, which has 20 students. The census sampling technique was chosen because the population was relatively small (fewer than 30 people), so the entire population served as the sample. Class XI F9 was purposively selected

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because it participates in the PLP (School Field Introduction) LANTIP program and is taught by the researcher. Thus, the selected sample is considered representative and appropriate for measuring the impact of Duolingo use on that class's learning (Sugiyono, 2017).

The research instrument consists of a 15-item short-answer test based on the "Saluer et se présenter" chapter in the Explore A1 textbook. Each item was designed to cover a specific subtopic of the learning material (*Saluer, Demander/donner des nouvelles, Prendre congé, Se présenter, Présenter quelqu'un, Les personnes, Les nombres 0–10*). Brown (2010) stated that one of the requirements for a good test is practicality. A short answer test of 15 questions, which can be completed in 20–30 minutes by high school students, fits the effective duration of student focus and does not take up the entire class period, allowing the remaining time to be used for reflection or discussion (in accordance with the principles of DL). Similarly, S. Arikunto (2021) explains that 15–20 questions per Basic Competency in a formative test is ideal to maintain a balance between content validity and student psychological well-being. Before use, the instrument's content validity was tested by comparing each item with the learning objectives and instructional material using the rubric as shown in Table 1. This item rubric includes the variables under study, indicators, and item numbers, ensuring that each question is directly linked to the established competency indicators (Syuhada et al., 2025). The test document was then consulted with experts (advisors and French teachers) to assess its appropriateness and completeness. This expert feedback was used to revise the instrument until it was deemed content-valid (measuring the intended material).

For reliability, the instrument's consistency was assessed using Cronbach's Alpha. Reliability test data were obtained from a sample of 20 students. The calculation results showed a Cronbach's Alpha value of 0.783. According to the criteria of (Arikunto, 2021; Sugiyono, 2017), an α value ≥ 0.6 indicates that the instrument is reliable. With a value of 0.783, the instrument falls within the 0.60–0.80 range, which is considered reliable. This means the instrument has good internal consistency and is suitable for measuring student learning outcomes.

Table 1. Test instrument rubric

LEARNING OBJECTIVES	INDICATOR	QUESTION NUMBER	QUESTION FORM
1. Students can learn simple vocabulary about French self-introduction.	Students can use French self-introduction expressions.	1, 2	Short-answer
2. Students can learn how to ask for news in French.	Students can use expressions to ask for news in French.	1, 2	Short-answer
3. Students can learn French greeting sentences.	Students can use French greeting sentences.	1, 2, 3	Short-answer
4. Students can introduce themselves in French.	Students can use French self-introduction expressions.	20	Short-answer
5. Students can learn how to introduce someone in French.	Students can use expressions to introduce someone in French.	2	Short-answer
6. Students can identify and name objects/things in French.	Students can memorize objects/things in French.	4, 5, 9, 10, 11, 12, 13	Short-answer
7. Students can learn French characters.	Students can determine French characters.	14, 15	Short-answer

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8. Students can know the numbers 0 to 10 in French.	Students can memorize the numbers 0 to 10 in French.	6, 7, 8	Short-answer

The data collection process began with administering a pretest to all students in the sample group before the intervention. The pretest was administered in class to assess the students' initial proficiency in the French vocabulary they had previously learned. Following the pretest, instruction took place over several sessions using the Duolingo app as the primary medium. Each student used Duolingo to access vocabulary exercises aligned with the targeted material, with the teacher guiding the learning sessions. Duolingo-based learning continued until all the material was covered. After the learning sessions were completed, a posttest was administered using the same instrument to measure improvements in learning outcomes. Both tests (pretest and posttest) were administered under controlled conditions in the classroom and allowed sufficient time for students to concentrate fully. The results of the pretest and posttest, in the form of each student's numerical score, were recorded as quantitative research data. This data served as the basis for an analysis to determine whether learning outcomes changed following the Duolingo-based instruction.

Learning outcome data (pretest and posttest scores) were analyzed using both descriptive and inferential statistics. First, descriptive statistics, including the mean and standard deviation of the pretest and posttest scores, were calculated to describe the students' initial and final proficiency levels. Next, a paired t-test was conducted to test the difference between the pretest and posttest means. A paired t-test was appropriate because the data came from a single group of students who were tested twice (before and after the intervention) (Syuhada et al., 2025). The results of this inferential analysis indicate whether there was a significant increase in students' vocabulary scores after using the Duolingo app.

3. RESULTS AND DISCUSSION

The following presents the research results on French learning outcomes for SMA Negeri 2 Kudus students at the beginner level using Duolingo, along with a discussion of its application.

Duolingo Implementation in beginner-level French learning

The research was conducted on March 4 and 5, 2024, with 20 students of class XI F 9 of SMA Negeri 2 Kudus. Class XI E is the class used during the PLP UNNES teaching practice. Sampling was based on the number of students present throughout the research. The material provided and tested was *Saluer et se présenter*. This is the second piece of material after the introduction to the alphabet and numbers in French. By mastering this material, students go through a learning experience designed around three primary stages to achieve the learning objectives. First, students learn simple vocabulary for self-introduction, various greeting sentences, how to ask for the news, and how to introduce others in French by watching learning videos and PowerPoint slides. Second, to apply, students can introduce themselves and work through a series of practice games on the Duolingo app to strengthen reading and pronunciation skills, both orally and in writing. Third, to reflect, students self-reflected on the self-introduction learning process they had undertaken to evaluate the extent to which they were able to use French when interacting with teachers or peers. As a final evaluation, a written test on the material *Saluer et se présenter* was administered. The stages of implementing the Duolingo application in beginner-level French learning for students at SMA Negeri 2 Kudus are as follows:

Understanding phase

In the understanding phase, the primary focus of learning is to build students' cognitive foundations and guide them in constructing meaning from new information. This process begins with a cognitive apperception activity, in which students are invited to answer various

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trigger questions about cultural differences in greetings between Indonesians and French people to encourage active engagement from the start of the session. Entering the observation and identification phase, students watch a learning video and presentation slides to identify authentic greeting vocabulary and self-introduction phrases. This knowledge is then reinforced through a knowledge-construction process during an interactive question-and-answer session with the teacher. In this phase, students learn to group vocabulary into appropriate usage contexts, such as distinguishing formal and informal greetings, to achieve a deeper understanding of the language. As part of digital literacy integration, students are directed to use the Duolingo application to study the material in the "Start with the Basics" menu, which serves to validate and strengthen the theoretical understanding previously presented by the teacher.

Applying phase

In the application phase, the learning focus shifts to using knowledge in practical, interactive situations. In this phase, students engage in guided practice through the Duolingo app by completing a series of gamification-based exercises, such as arranging words to build introductory sentence structures and matching images to appropriate vocabulary. Active linguistic experiments are also conducted using the speaking feature to practice pronouncing phrases like "*Bonjour"* and "*Je m'appelle"*, and the listening feature to test acuity for authentic dialogue. In addition to digital interaction, active collaboration is maintained in the classroom through collaborative reading of introductory texts, where the teacher monitors progress and provides direct pronunciation correction. A key advantage of this phase is the instant feedback provided by Duolingo's autocorrect system, which allows students to immediately recognize and correct their mistakes independently.

Reflecting phase

The learning process concludes with a reflection phase that emphasizes self-evaluation, metacognition, and internalization of values. Students evaluate their results by reviewing their points or scores in the Duolingo app as a benchmark for their vocabulary mastery. The metacognitive element is reinforced by asking students to self-reflect on the challenges they face in pronunciation and writing, and on the strategies they use to improve them through the app's practice features. Next, the teacher and students conclude the material learned, providing reinforcement and appreciation for individual progress. Finally, the self-learning aspect is implemented by encouraging students to continue accessing Duolingo independently at home to maintain memory retention and prepare for future learning in class.

Learning Outcomes of Duolingo Implementation

To measure the effectiveness of a series of learning activities implemented, including apperception, video observation, and independent practice using the Duolingo app, an evaluation was conducted using a learning outcome test. This evaluation was designed to assess the extent to which students achieved the learning objectives, particularly in mastery of basic vocabulary, greetings, and the ability to introduce themselves and others in French. The following is a comparison of student learning outcomes, as outlined in the pretest and posttest assessment results table:

Table 2. Pretest and posttest assessment results

STUDENTS	PRE-TEST POINT	POST-TEST POINT
AMF	60.00	86.67
ADC	80.00	86.67
AWP	73.33	93.33
AS	86.67	93.33
BS	46.67	33.33
CR	60.00	93.33
DM	60.00	86.67
DU	93.33	93.33
EM	66.67	93.33

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FPF	73.33	80.00
FA	86.67	93.33
FNN	80.00	93.33
FMS	80.00	93.33
IDL	73.33	93.33
MN	86.67	93.33
MK	46.67	93.33
MA	53.33	80.00
NA	86.67	100.00
SB	93.33	93.33
WA	93.33	100.00

Based on the table above, the average posttest scores are higher than the pretest scores for most students after participating in Duolingo learning activities. Several students showed notable improvement, including MK, whose score increased from 46.67 to 93.33, and NA and WA, who achieved a perfect score of 100.00 on the posttest. This pattern suggests that students were able to better understand and apply the material *Saluer et se présenter* after engaging with the application's interactive features. However, one student (BS) experienced a decrease in score from 46.67 to 33.33, indicating that not all learners benefited equally from the intervention and highlighting the need for reflection and additional support to address individual learning challenges. Overall, the descriptive comparison of pretest and posttest results indicates a positive trend in students' learning outcomes after using the Duolingo application.

Table 3. Learning outcome statistics

DATA	PRE-TEST RESULTS	POST-TEST RESULTS
Highest	93.33	100.00
Lowest	46.67	33.33
Mode	86.67 (appeared 4 times)	93.33 (appeared 12 times)
Median	76.67	93.33
Mean	74.00	88.67

The increase in the average (mean) score from 74.00 to 88.67 indicates that the Duolingo-based learning intervention has a significant positive impact on students' understanding of the material. This is reinforced by the Mode value on the post-test, which reached 93.33, with most students (12 out of 20) achieving this high score after participating in the learning process. Although the lowest score decreased due to one special case (student BS), overall, the median and mode data reflect students' successful knowledge construction. The standard deviation for the pretest scores was 15.28, while that for the posttest scores was 14.03. These values indicate that, at the beginning, the variation in student performance was relatively more widespread. After the Duolingo intervention, the variation in scores decreased slightly, suggesting that student performance became more consistent by the end of the study. Furthermore, the results of the paired t-test showed a t-value of -4.7586 with a p-value of 0.0001366 (< 0.05). These results indicate a statistically significant difference between the pretest and posttest scores. Thus, it can be concluded that using the Duolingo app significantly improves students' French vocabulary learning outcomes in the *Saluer et se présenter* material. However, because this study employed a one-group pretest–posttest design without a control group, the improvement in scores cannot be attributed solely to Duolingo. Other factors, such as classroom instruction, student motivation, or repeated exposure to the material, may also have contributed to the observed improvement.

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4. CONCLUSION

A French learning study using the *Saluer et se présenter* material at SMA Negeri 2 Kudus successfully implemented the Learning framework across three integrated stages, using the Duolingo application as the primary medium. The understanding stage focused on building cognitive foundations through apperception of cultural differences, observation of videos and slides, and digital introduction of basic materials to construct meaning. Next, during the application stage, students actively used Duolingo's interactive features, such as speaking and listening, as well as class collaboration, to practice the language in real-world situations, with instant feedback. This series concluded with a reflection stage that emphasized self-evaluation of score achievement, metacognitive discussions on writing and pronunciation challenges, and encouragement to engage in continuous independent learning to maintain student memory retention. Impressive improvements were evident in student scores, confirming that active involvement in the understanding and application stages, through interactive features, helped students internalize vocabulary and sentence structures effectively. Although specific individuals faced learning barriers that required further reflection and guidance, overall, the evaluation results validated that the use of digital media supported optimal achievement of the learning objectives of self-introduction and greetings. Additional research is recommended to explore the long-term use of the Duolingo app to measure long-term memory retention and its effectiveness with more complex French grammar materials.

5. AUTHORS' NOTE

We declare that there is no conflict of interest in the research or publication of this article. We also guarantee that this work is original, free from plagiarism, and has not been published elsewhere.

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