AG EDITOR

Incorporating AI-Generated Duolingo within Collaborative SLL: Spoken English Students at FLDM-USMBA as a case study

Incorporación de Duolingo generado por IA en el SLL colaborativo: estudiantes de inglés hablado en FLDM-USMBA como estudio de caso

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ABSTRACT

In today's digital age, the combination of AI-generated learning platforms and Second Language Learning (SLL) has revolutionized the way students learn new languages, mostly because these tools provide individuals with personalized learning content that is actively adjusted and tailored so that students can dynamically enhance their language skills according to their strengths, weaknesses, and progress. Thus, the prospect of such tools expands beyond self-paced learning and creates considerable opportunities for improvement in collaborative language learning settings. This article explores the integration of Duolingo into group-based learning contexts, focusing on its potential to enhance collaborative Second Language Learning (SLL) through its gamified structure and community features such as leaderboards, clubs, and challenges. The study adopts a mixed-methods exploratory design and was conducted among 189 Bachelors (BA) students enrolled in Spoken English (SE) classes during the 2024-2025 academic year at Sidi Mohamed Ben Abdellah University of Fes, Morocco (USMBA). Being a case study, the study investigates how Duolingo; as an AI-generated Language Learning Tool, and how its collaboration-focused features influence students' motivation, engagement, and communication skills within a collaborative SLL framework. The study argues that when used alongside traditional classroom methods, Duolingo serves as a powerful tool for promoting both individual and group-based language acquisition, thereby enhancing the overall learning experience.

Keywords: Artificial Intelligence; SLL; AI-Generated Language Learning Tools; Collaborative SLL Environments.

RESUMEN

En la era digital actual, la combinación de plataformas de aprendizaje generadas por IA y el Aprendizaje de Segundas Lenguas (SLL) ha revolucionado la forma en que los estudiantes aprenden nuevos idiomas, sobre todo porque estas herramientas proporcionan a los individuos contenidos de aprendizaje personalizados que se ajustan y adaptan activamente para que los estudiantes puedan mejorar dinámicamente sus habilidades lingüísticas en función de sus puntos fuertes, sus puntos débiles y sus progresos. Así pues, la perspectiva de este tipo de herramientas va más allá del aprendizaje a ritmo individual y crea considerables oportunidades de mejora en entornos de aprendizaje colaborativo de idiomas. Este artículo explora la integración de Duolingo en contextos de aprendizaje en grupo, centrándose en su potencial para mejorar el aprendizaje colaborativo de segundas lenguas (SLL) a través de su estructura gamificada y características comunitarias como tablas de clasificación, clubes y desafíos. El estudio adopta un diseño exploratorio de métodos mixtos y se llevó a cabo entre 189 estudiantes de licenciatura (BA) matriculados en clases de inglés hablado (SE) durante el curso académico 2024-2025 en la Universidad Sidi Mohamed Ben Abdellah de Fes, Marruecos (USMBA).

Siendo un estudio de caso, el estudio investiga cómo Duolingo; como una herramienta de aprendizaje de idiomas generada por IA, y cómo sus características centradas en la colaboración influyen en la motivación, el compromiso y las habilidades de comunicación de los estudiantes dentro de un marco de SLL colaborativo. El estudio sostiene que, cuando se utiliza junto con los métodos tradicionales de clase, Duolingo sirve como una poderosa herramienta para promover la adquisición de idiomas tanto individual como en grupo, mejorando así la experiencia global de aprendizaje.

Palabras clave: Inteligencia Artificial; SLL; Herramientas de Aprendizaje de Idiomas Generadas por IA; Entornos Colaborativos de SLL.

INTRODUCTION

Language learning has been assimilating numerous developed AI generated tools. Duolingo was released in November 2011 by Louis Vohn Ahn and Severin Hacker. It offers around 95 languages to learn, and more than 30 million have already signed in on it. The application has gained recognition for being the most used learning platform that combines both worlds of education and entertainment, meaning that this learning tool offers an interactive and gamified approach to enhance the language learning process. Duolingo offers students, lessons that help enhance their writing, reading, listening, and speaking skills while keeping them engaged, thanks to its gamified nature.

The platform also implements AI to personalize students' learning according to their knowledge background, their strengths, their weaknesses, and their progress. Additionally, Duolingo adopts a rewarding approach to motivate and engage learners with the learning materials, which are tailored according to their needs. Furthermore, Duolingo has developed new features such as peer interactions and group-based activities. Even though this language learning tool is all about self-paced learning, it also encourages a sense of teamwork and collaboration throughout workshops, clubs, and challenges. This interdisciplinary approach raises several questions.

- How can AI-generated language learning tools impact students' SLL?
- How can Duolingo as an AI-generated language learning tool be incorporated into collaborative SLL environments to develop language skills?
- How does this collaboration influence students' motivation, engagement, and intercultural communication skills?

LITERATURE REVIEW

The implementation of AI in the educational sector

Artificial Intelligence (AI) has been the center of attention in the last few decades. AI can be defined as a field of technology that permits people to rely on a technology platform that serves as an assistive tool.[1] According to Haugeland, AI is a cognitive architecture that entails creating a system that communicates with the external environment using cognitions and behaviors that operate similarly to the human brain.[2] AI is referred to as a computerized system that models and generates intelligent applications for computers and smartphones. These gadgets can operate an extensive range of tasks with human assistance. Additionally, it was argued that AI can help in teaching and learning as well.[4] As a result, AI has again gained attention from scholars as a new, revolutionized tool for teaching and learning processes in the educational industry. Although the idea of incorporating AI in education is not unprecedented because the mathematical possibility of AI and the evolution of AI in learning and educational systems (suggesting the Turing Machines) have been examined and have experienced fluctuations.[5] Bibauw et al., on the other hand, suggest that AI-generated teaching tools, such as chatbots, play a significant role in the educational system by offering personalized learning, facilitating interactions between learners, and providing instant feedback.[6]

Regarding the facilitation of interaction, it is executed by the incorporation of a variety of methods that include textualization, audible, and visual aspects.[7] Moreover, it was highlighted that the enhanced features of AI that have significantly impacted the way humans learn emphasizing the fact that generated AI tools can automatically generate outputs, such as texts and images, machine-produced voices, and audio which improve students' speaking and writing skills and maintain their involvement and interest.[8]

The effect of AI-generated tools on SLL

Several studies have been carried out focusing on the effects of AI-generated learning tools on language learning skills in English as a second and a foreign language context. Accordingly, learners nowadays feel more comfortable learning languages through AI-generated language learning tools than through human tutors.[9] Moreover, AI-generated language learning tools enhance vocabulary retention and reading comprehension through spaced repetition and adaptive difficulty.[10] Learners are guided through progressively challenging

tasks that adapt based on their input, creating a personalized learning trajectory. This tailored approach is particularly beneficial in SLL contexts, where learners often come from diverse educational backgrounds.

Beyond vocabulary and grammar, AI-generated tools also support the development of writing and speaking skills. For instance, platforms such as Grammarly and Quill Bot offer automated feedback on grammar, syntax, and clarity, helping second language learners become more aware of linguistic structures and writing conventions. Ranalli found that ESL students who regularly used Grammarly showed significant improvement in grammatical accuracy and error correction in academic writing.[19] Similarly, tools like ChatGPT are being explored for their potential to provide real-time conversational practice and model natural language use, although their effectiveness varies depending on how learners engage with the prompts.

In terms of oral communication, AI tools like ELSA Speak offer pronunciation feedback using speech recognition technology, which can be especially useful for learners with limited exposure to native speakers. It was noted that such tools can play a supporting role in speaking practice, providing learners with confidence and self-awareness in pronunciation and intonation.[21] Motivation and learner autonomy are also key themes in the literature. AI-generated tools often incorporate gamified elements (such as points, badges, and progress tracking) that help sustain engagement and motivation over time.

Accordingly, these features encourage learners to set personal goals and track their progress, which is essential in maintaining consistent language practice outside of formal instruction.[21] However, researchers also caution against overreliance on AI tools. While they offer significant benefits in terms of access and adaptability, they may lack the nuanced understanding of context, pragmatics, and cultural cues necessary for deeper language proficiency.

Hence, technology should enhance; not replace, communicative, interaction-based teaching methods. In conclusion, the literature suggests that AI-generated learning tools can significantly enhance second language learning outcomes, particularly in vocabulary acquisition, grammatical accuracy, and learner engagement. Their adaptability and instant feedback support learner autonomy and help bridge gaps in formal instruction. Nonetheless, their effectiveness is maximized when used in complement with interactive and communicative pedagogical approaches, ensuring that learners benefit from both personalized technology and meaningful human interaction.

Duolingo as an AI-Generated Language Learning Tool

When it comes to language acquisition, Duolingo is one of the most dominant and influential AI-generated language learning applications in today's industry.[18]

Gamification alludes to the use of game-based features to engage and motivate students as well as to encourage them to learn efficiently and effectively.[11] Duolingo is the perfect mixture of learning and gamification. Govender et al. add that some of the gamification elements Duolingo uses to promote students' engagement, motivation, and learning process are challenging assignments, recognition bonuses, methodical levels, and the ranking of students based on their progress and achievements.[12] To challenge the students, Duolingo assembles a challenging range of activities as a daily objective that is rewarded if attained to keep the students more involved and engaged.[13] Last, AI-generated language learning tools, such as Duolingo, show great flexibility in considering the learners' preferences, which enables them to have an automatic recommendation of the most appropriate and the most fitting learning time, content, and style.[14]

Even though Duolingo, as an AI-generated language learning tool, is extremely developed, used, and recognized for its spectacular vocabulary teaching, several shortcomings (grammar teaching, pronunciation attention, and user experience) have been highlighted.[15]

Moreover, Zhai et al. elaborated on the issues related to Duolingo and stated that when these tools provide students with personalized learning feedback, they disregard the impact of the cultural background.[15] They also argue that some students might encounter stress during the learning process and highlight the fact that some of the students' inputs while using Duolingo are misunderstood.[15]

In a study conducted by Rodríguez et al., it was suggested that collaborative language learning environments (involving two or more students working together to address issues, fulfill tasks, and/or create a product) can solve the previously cited issues. Collaborative language learning provides the students with the opportunity to improve their language skills and to overcome their unwillingness to interact or to complete a task.[16]

Moreover, it has been proven that collaboration in language learning helps students improve their intercultural communication.[17] The group discussions encourage students and motivate them, thanks to the instant feedback they get on their exercises, their assignments, and their pronunciation.

METHOD

The article examines the influence of Duolingo as an AI-generated language learning tool within the collaborative SLL environment provided. The targeted participants are the Bachelor of Arts (BA) students enrolled in Spoken English Classes (SEC) at the Faculty of Letters and Human Sciences Dhar-El Mahraz, USMBA of Fes-Morocco (FLDM) in the 2024/2025 academic year. To collect quantitative and qualitative data simultaneously, a

mixed-method approach and design were opted for. The quantitative design was used to assess the basic data, mainly demographic profiles, and students' behaviors and endorsements. The qualitative design was employed to elaborate on the student's choices and opinions for in-depth data.

Participants

The targeted participants (n: 189) are BA students from the English department of FLDM enrolled in the SEC in the 2024/2025 academic year. These students were specifically chosen and assigned to work on Duolingo as an AI-generated second language learning tool, in order to test the effects of AI-generated SLL within a collaborative learning environment on them. The assignment and the choice of the sample were purposeful due to the nature of the course (the need to learn as much vocabulary as possible, the need to be aware of the correct pronunciation of these words in order to transcribe, and word stress correctly).

Data Collection

The research focused on investigating the incorporation of Duolingo an AI-generated Second Language Learning tool within a collaborative SLL environment. The research instrument used was a self-administered questionnaire that was developed through Google Forms.

The questionnaire was divided into four distinct sections. The first one was mainly questions pertaining to the demographic data of the participants, typically encompassing their age, gender, and access to the internet. The second part consisted of questions addressed to investigate the familiarity and the frequency of usage. The third section inquired about the respondents' perceptions of Duolingo as an SLL tool among students. The last section involved questions exploring the impact of integrating Duolingo within a collaborative SLL environment.

RESULTS

When it comes to the respondents' demographic profiles, the results demonstrate that 58 % of participants were female students (110/189), and 42 % of the participants were male students (79/189). The data collected shows a percentage of 57,2 % for the age group of 19-26, a percentage of 29,5 % for the age group of 22-26, a percentage of 9 % for the age group of 26-32, and a remaining percentage of 4,3 % for students older than 32. Additionally, the demographic data analysis revealed that 94,1 % of the participants had internet access, while 5,9 % had no internet connectivity.

The second section of the questionnaire dealt with general information on Duolingo. The questions included the respondents' level of familiarity with Duolingo, how often they use it, the purpose of their usage, and how they first discovered the AI-generated language learning tool. Accordingly, 41,8 % of participants have high exposure and familiarity with Duolingo and general knowledge of how it functions. 19,6 % of respondents have very high exposure to Duolingo and are more fluent and proficient in using it. Those who only have a moderate familiarity and those who are slightly familiar with Duolingo represent 19 % and 12,2 % respectively. The 7,4 % remaining were students with low exposure to Duolingo.

Regarding the frequency of use, 54 % utilize the platform weekly to improve their second language learning, 16,4 % utilize it monthly, 14,3 % utilize it daily, 6,3 % utilize it rarely, and the remaining 9 % never use it. This indicates that most participants are Duolingo users.

In terms of the purpose of use, according to figure 1, 56,6 % use Duolingo for learning a new language, 19 % stated using it to improve existing language skills, 14,9 % use it as a source of entertainment, and the remaining 6,9 % use it for preparing for a test.
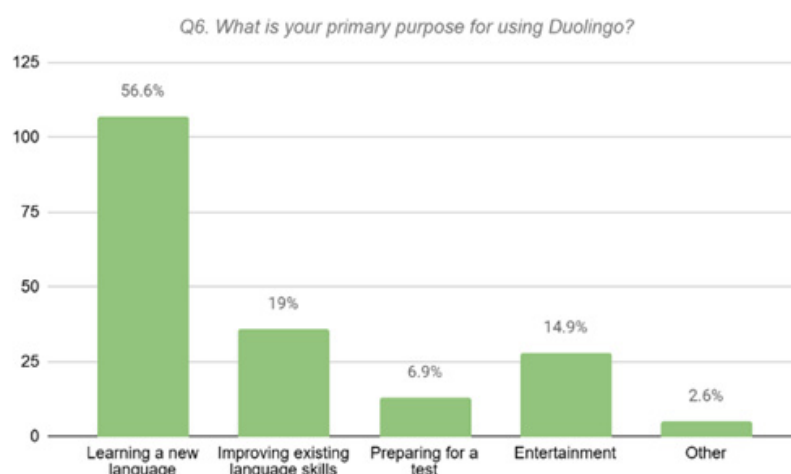

Figure 1. Respondents' purpose of Duolingo use

Concerning how the participants discovered Duolingo, results showed that most respondents (52 %) discovered it through social media platforms, 37 % checked advertisements as their source of discovery, and the remaining 8 % were encouraged by family and friends.

For the respondents' perception of Duolingo as an SLL tool (see figure 2), participants were generally asked about the aspect of language learning that Duolingo helps improve. The most dominant improved language aspects throughout the use of Duolingo were speaking skills (44 respondents), Vocabulary (41 respondents), and Writing Skills (37 respondents). The less enhanced language aspects throughout the use of Duolingo were Reading Skills (26 participants), Grammar (21 participants), and Listening Skills (20 participants).

Furthermore, participants were asked to appoint the one improvement they noticed in their language abilities after using Duolingo, as well as to suggest the improvement needed in the Duolingo learning process for better future results. The most relevant and interesting responses were summarized in table 1.

Table 1. Students' feedback on the areas of improvement and enhancement for Duolingo	
Questions	**Respondents' Feedback**
Q10.	"After using Duolingo, I felt more comfortable in engaging in conversations thanks to the vocabulary progress that I made"
	"As a student, Duolingo gave me more confidence to participate in conversations because the speaking and listening exercises that it provides helped me work more on my pronunciation and it made it easier to understand spoken language in regular conversations"
	"I feel that Duolingo has helped me develop multiple areas of language learning. It made me build up my vocabulary as well as my grammar skills, which have improved a lot because the lessons provided explained the most difficult rules in the easiest way!"
Q11.	"Honestly, I am more than satisfied with my Duolingo second language learning experience, however, I would like more detailed feedback on my mistakes"
	"For me, it is hard to find an AI generated learning language tool such as Duolingo. This app has a lot of potential, the only downfall that I can mention is more lessons! I just need more to deepen my skills"
	"I truly believe that Duolingo is one of the most prominent language learning tools! Yet, I feel that it needs to include more content-based lessons"

The results have demonstrated that Duolingo is very efficient when it comes to second language learning in the sense that it helps the students build up their vocabulary based on their needs and learning level, as well as their grammar skills. Additionally, Duolingo is very effective when it comes to enhancing speaking, listening, reading, and writing skills according to the student's needs. Initially, students were asked whether they contributed to collaborative activities while using Duolingo, as well as if this collaboration had helped enhance their language learning process, to which 87 % of participants answered positively. Then we proceeded to question the participants on which language aspect they felt improved best with this incorporation (figure 2). Depicts the data collected on the most developed skills with Duolingo and Collaborative Learning.
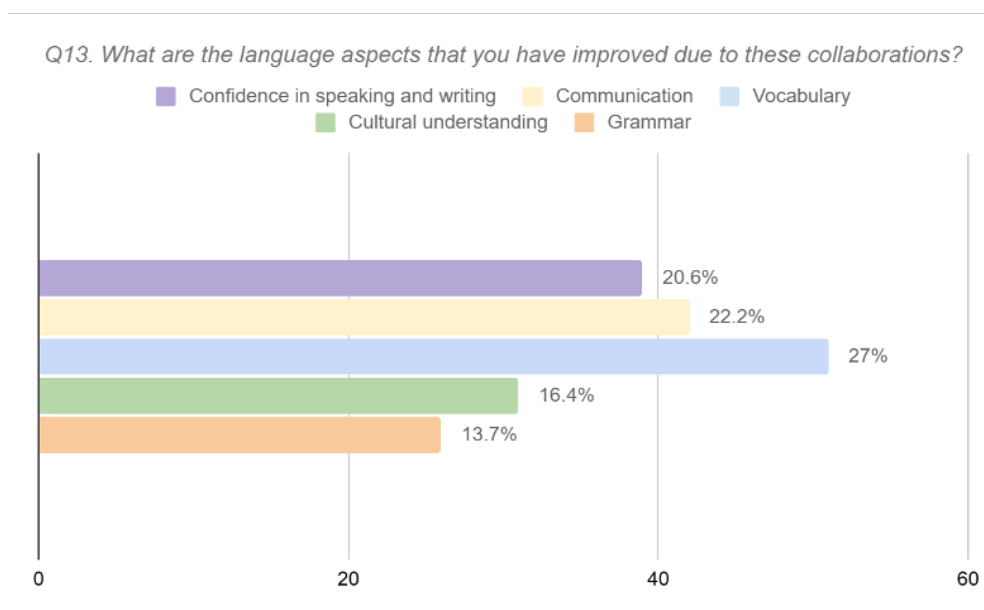

Figure 2. The students' most enhanced skills with Duolingo & Collaborative Learning

The study was also interested in students' insights on certain activities. Participants were asked to evaluate their behavior and endorsement of Duolingo-related activities. They were given four response options to choose from. Table 2 summarizes the results.

Table 2. Participants' estimates with related Duolingo behavior					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
"I felt that competition and collaboration motivate me to practice more."	N=5 P=2,6 %	N=23 P=16,2 %	N=53 P=28 %	N=40 P=21,2 %	N=68 P=36 %
"I feel very comfortable and more engaged when I share my progress and achievements with others in Duolingo."	N=16 P=8,5 %	N=31 P=16,4 %	N=39 P=20,6 %	N=56 P=29,6 %	N=47 P=24,9 %
"I feel that speaking and practicing collaboratively has helped me improve faster than learning on my own."	N=25 P=13,2 %	N=7 P=3,7 %	N=45 P=23,8 %	N=74 P=39,1 %	N=38 P=20,1 %
"I feel motivated to learn in Duolingo when my friends get higher scores or finish more units than me"	N=11 P=5,8 %	N=19 P=10 %	N=37 P=19,5 %	N=89 P=47,1 %	N=33 P=17,5 %
"Being part of Duolingo clubs and interacting with people around the world encourages me to learn more about their language."	N=18 P=9,5 %	N=18 P=9,5 %	N=41 P=21,7 %	N=68 P=36 %	N=44 P=23,3 %
"I feel that practicing with others in combination with AI personalized	N=9 P=4,8 %	N=6 P=3,2 %	N=35 P=18,5 %	N=76 P=40,2 %	N=63 P=33,3 %

In view of students' satisfaction with the combination of collaborative learning and Duolingo, as AI generated SLL tool, most of the students feel extremely motivated when working with their peers. Additionally, Duolingo clubs and competitions make the students more engaged and motivated to learn more effectively and obtain better grades. The interaction with students around the world makes the students have better communication skills across various cultural contexts. The incorporation of Duolingo and collaborative learning then enhances student language proficiency, increases their motivation and engagement, and improves their intercultural communication. Open-ended questions were asked to investigate the same behavior and the feedback on it supports it (see table 3).

Table 3. Students' feedback on their experience with Duolingo and CL	
Questions	Respondents' Feedback
Q15.	"As a student, I really appreciate the fact that Duolingo can provide me with lessons that mainly focus on my weakness and then put me in groups to collaborate to solve the practices related to the lessons". "Peer reviewing is one of the situations that I really like in this combination because it makes me learn more from my friends and my mistakes. So basically, we learn more form each other". "Using AI-personalized learning alongside collaborative practice has been helpful. In other words, this combination encourages me to learn at my own pace targeting my struggles, and while working with classmates allows me to have immediate feedback and make it more entertaining".
Q16.	"Working in collaboration with other students gave me an opportunity to apply the new vocabulary and grammar that I have learned in the AI-personalized lessons in real conversations". "Group discussions helped me understand and clarify concepts I struggled with, and it provided me with other students' insights into how they approached and understood similar challenges". "Group challenges motivate me to focus more on the practices that are given to me depending on my weak areas and getting feedback from my peers makes it more engaging. So basically, for me working independently and collaboratively are complimentary".

DISCUSSION

The primary aim of this study was to investigate the combination of AI-generated language learning tools (Duolingo) and a collaborative second language learning environment. The findings indicated that Duolingo has changed the way in which students learn languages, especially with the implementation of AI. Most Duolingo users expressed complete satisfaction with the learning experience they were offered. The latter is adaptive and personalized with the language learning process according to the students' needs and requirements. Additionally, Duolingo users exhibited a great improvement in multiple language aspects such as vocabulary, grammar, speaking skills, reading skills, writing skills, and listening skills. These positive outcomes can therefore be attributed to students' engagement and motivation, which have significantly grown while using Duolingo's AI-generated personalized learning tool, especially after the incorporation of features that promote interaction and group work.

Regarding promoting interaction, Duolingo has started to offer shared practices, clubs, forums, games,

friendly competitions, and group discussions…, this is how the collaborative SLL environment was applied in Duolingo. This resulted in enhanced language learning and improved intercultural communication.

CONCLUSIONS

Despite the valuable insights provided by this study, several limitations must be acknowledged. First, the research was conducted within a specific and limited institutional context that is BA students enrolled in Spoken English classes at the University of Sidi Mohammed Ben Abdellah, Fes. This constrains the Wider applicability of the findings to different educational settings.

Future studies could replicate the research across multiple institutions, age groups, and proficiency levels to obtain more comprehensive data. Additionally, AI-generated feedback from AI-generated tools such as Duolingo, though immediate, is not always context-sensitive or pedagogically aligned with curriculum standards. Future research could explore how integrating instructor-mediated AI feedback might bridge these gaps. Finally, ethical and practical concerns surrounding AI implementation in education, such as data privacy, algorithmic transparency, and digital equity, remain underexplored. Future investigations should critically examine these issues to ensure that AI integration promotes inclusive and ethical learning environments.

Although this study highlights the promise of AI-generated tools in supporting collaborative second language learning, additional interdisciplinary research is essential to improve implementation methods, assess sustained outcomes, and promote fair access for learners from varied backgrounds.

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CONFLICT OF INTEREST
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Methodology: ASMAR Khaoula.
Project management: ELJAI Marwa.
Supervision: BELFAKIR Latifa.
Drafting - original draft: ASMAR Khaoula.
Writing - proofreading and editing: ASMAR Khaoula, ELJAI Yassamine.