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## The Efficiency of Tailored Systems for Language Education: An App Based on Scientific Evidence and for Student-Centered Approach

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**Abstract:** In the vulnerable and unstable contexts that characterize populations in mobility between countries, especially immigrants and refugees, the second language learning has assumed new traits of difficulty. To help the new generation of learners, mainly with origin in forced immigration, the mobile-assisted learning helps motivation for language learning and reduces anxiety related to language acquisition. Attending to this challenge educational scenario, this review study presents a literature systematic analysis and a concrete technology tool that advocates the student-centered approach. A mobile pedagogical plan was developed for the learning of European Portuguese as a Second Language and as a Foreign Language. A critical review of 38 studies was conducted to understand how the mobile-assisted learning responds to the inclusion and education, especially concerning minorities. Based on previous empirical data with 108 immigrants, we understand the type of tasks that new immigrants have more difficulty learning in Portuguese. It was developed as a mobile app for Android, IOS, computers and tablets: the GoGenius app. In mobile format, individuals can access fourteen themed units with a symmetrical game architecture. These games focused the tasks and themes with priority for new language learners who recently arrived in a hosting country. These units involve a consistent number of working hours that intentionally intend to complement to the contact hours that the subjects have in classroom contexts or in unstable communication contexts (daily communication). This technology project aims to match “tailored” psychological and technological resources. Flipped classroom approach showed how mobile-assisted learning reinforces the educational goals worldwide, specifically for language learning. However, mobile tools should be well structured and centered on students’ needs, especially with migration backgrounds.

**Keywords:** *Immigration, mobile-assisted language learning, refugees, second language, technology-based education.*

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### Introduction

In order to approach tailored learning in non-mother languages using mobile techniques, it is essential to mention mobile-assisted language learning (MALL). With MALL, we have seen the maximization of digital methods such as apps, which allow ubiquity, subject-centred learning (increased sense of autonomy), and rapid adaptation by almost all cultures. This is also due to the fact that learning from mobile devices already had the m-learning model that accommodated the current e-learning system as a precedent (Çakmak, 2019; Kamasak et al., 2021). MALL makes even more sense in the last two years with the onslaught of the pandemic that isolated entire populations and redirected them to an exclusively electronic space (Kamasak et al., 2021). Mobile applications and learning have become faster and the use of electronic resources has skyrocketed. Previously, Naismith et al. (2004) presented theoretical approaches such as behaviourism and constructivism, among others. In the first approach, the subject uses mobile devices for learning that is guided by stimuli reinforced by sequenced responses that direct the acquisition of skills in a specific and supposedly fast period of time. In this case, the games are more focused.

In the constructivist approach – the one we advocate with the project presented in this study – the subjects evolve in learning content not necessarily through a game of points, but through an autonomous manipulation of the activities they intend to carry out in the periods they want, without prejudice to the full acquisition of proficiency. Regarding the context in which the learners are: linguistic competences are finite in terms of levels (e.g., lexical, phonological, and semantic

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levels), but learners may have a predisposition to learn certain levels and not others. Either out of necessity or out of motivation.

The constructivist approach that MALL has been enabling – which was not evident with the Computer Assisted Language Learning (CALL) model – supports a greater chance of success for language teaching apps: Second Language (L2) and Foreign Language (FL). Depending on the L2 and FL, the learning objective and motivation are changeable when using apps and in e-learning mode. Graham (2007) and Mercer and Ryan (2010) refer to the importance of the MALL method becoming increasingly autonomous and effective, ensuring that the language teaching applications/instruments themselves allow learners to build personalized forms that suit their needs as distinct individuals. Additionally, the use of mobile applications and other instruments on smartphones allows the development of learning habits that correlate with motivation and a feeling of competence. Firstly, we reviewed the relationship between MALL and motivation, the relational mobility and the flipped approach. Secondly, we presented a project plan implemented as a mobile application for the European Portuguese Learning, concerning mostly the education of immigrants and refugees.

#### *Motivation and Mobile-assisted Learning*

This motivation is intrinsic (not extrinsic, nor instrumental) and is related to the sense of self-efficacy and autonomy (personal control). It is important to observe the analyses of Leis et al. (2015), who conclude that learners increase their adherence to the instruments and mobile applications available in the market when they feel that they can also use the applications from the classroom. This classroom introduction is a predictor of faster and more motivated learning with regard to mobile app engagement. Golonka et al. (2014) reviewed 350 studies on learning in the context of MALL and the results were positive for the correlation between smartphone use and autonomy in language learning. Once again, autonomy appears associated with intrinsic motivation, as recent studies attest (Sun & Gao, 2020).

Although different cultures (culturally distinct groups) adapt well to mobile devices for learning, the case of language teaching must allow subjects to find, within the same format/online game, different solutions and ways of understanding the meanings so that the learning process progresses and learners stay motivated and connected (Chen & Hsu, 2008). The authenticity of the audio-visual inputs is, therefore, important for this personal connection between subjects and the device to last.

This personal connection explains the intrinsic motivation behind the use of apps (Sun & Gao, 2020). Intrinsic motivation has been frequently mentioned here, considering that it is the one that most predicts the daily and disciplined use of the subject, in an autonomous but effective way of learning. The other motivations - such as extrinsic and instrumental - are more used and seen in the contexts of fortuitous or 'imposed' language learning (as in the case of foreign language learning in the schools' syllabi).

The first MALL studies and even some of the apps on the market do not correspond to a full learning process as they are reduced to electronic dictionaries or oral repetition tests. Currently, apps in their free form are still limiting as they become instruments focused on learning in a behaviorist style: spaced repetition tasks and the only level is vocabulary or grammar (Marques-Schafer & da Silva Orlando, 2018). They are well-known apps like Duolingo and Memrise, but they do not control effective and validated learning due to the lack of studies with reliable samples (Hanson & Brown, 2020). On the other hand, proficiency levels are not respected according to the Common European Framework for Languages (Council of Europe, 2001) or according to the American Council on the Teaching of Foreign Languages (ACTFL) (Huhn et al., 2021).

When we previously referred to the authenticity of the materials, it is important that the layout and sounds link learners to the mobile applications. We believe that if there are elements of the subjects' Mother Tongue (L1) that they can identify, adherence to more continuous learning will be successful. Examples include adding sounds and images that activate learners during their engagement with the teaching/learning instrument.

#### *Relational Mobility and Inclusive Mobile Applications*

With the continuation of migratory movements of populations and currently with the supremacy of electronic resources for individual learning of languages (less collaborative, however, because of successive periods of isolation), it is important to address the concept of relational mobility. This concept is important to understand the logic of learning and acculturation because relational mobility varies greatly according to the origin of ethnic and linguistic groups (Zhang & Li, 2014). And this relational mobility is correlated with different levels of self-esteem. Relational mobility determines the way how learners relate to their object of acculturation: in this case, language learning to fulfil their mobility objective.

Despite having mentioned the cultural ease of handling mobile applications and all the current gamification logic, learning a specific L2 or FL will depend on this intention of relational mobility. Hence, apps for language learning must necessarily be distinguished within L2 and FL insofar as the subjects' relationship with the language is affectively different. Learning a L2 is much more demanding and binding. Learning a foreign language requires less responsibility on the part of the subjects. Psychological engagement with language varies among minorities (Zhang & Li, 2014).

According to Ryabichenko and Lebedeva (2017), studies with different ethnicities and immigrant groups reveal an acculturation process that is differentiated according to family, ethnic, and individual levels. Thus, a mobile-based learning model will not yet be able to control these variables together, as it focuses on the individual level in comparison with others (family and ethnic). To this extent, it was important to design an app's plan with neutrality in terms of visual stimuli (considering the users' previous cultural input), but with a diversified cultural identity in the auditory inputs (the translation of instructions should be strongly related to the learners' linguistic identity).

Another factor that the aforementioned authors found to be crucial in acculturation was the generation effect. Younger generations may have the feeling and desire for heritage to be maintained, and visual and auditory stimuli (in L1) contribute to a significant increase in target language learning (L2 or FL). By controlling these variables (intrinsic individual motivation and the desire for inheritance maintained by new generations), it is possible to have technological models that successfully support these learnings.

In the meta-analysis conducted by Lee et al. (2014), scientific studies published between 1993 and 2013 revealed that learning via mobile apps increases motivation and meaning in terms of learning, from the learners' perspective. This was in addition to the significant increase in instruction that was measured at .54 regarding effect size (Cohen, 1960). Since 2014, studies have focused on the pedagogical, social, and acculturation advantages of the apps, especially given the evolution of the app format and the smartphone models themselves.

Therefore, it is important to refer to the most recent meta-analysis by Chen et al. (2020), which focused on 84 studies published between 2008 and 2018. They found an even larger effect size (.72) that attests to the effectiveness of the mobile method compared to traditional ones. Or a combination of both. The type of language (mother or second) was one of the moderators found as significant predictors. Depending on the type of target language (second or foreign), the instructional period needed and spent while using online instruments that assist learning will also be directly involved.

#### *Contact and Working Hours: Flipped Classroom Approach*

The time factor is at the basis of these results for the effect size of the two systematic reviews mentioned in the previous section. Learning through mobile devices eliminates the lack of time that schools and universities face in the face of the needs that foreign students (immigrants, refugees, and ERASMUS students) have. Mobile applications (apps) are the safest and closest solution to fill the working and contact hours of teachers and students (Elmurodov, 2020). On the other hand, learning with mobile resources allows for less behaviourism and produces less anxiety during the process of acquiring skills (Steel, 2012).

Still regarding time, according to a previous study with Portuguese samples conducted by Figueiredo (2010, 2022), the type of tasks (phonological awareness, alphabetical ordering, syntactic decision) demands longer response time compared to other tasks such as lexical decision-based in the image. This differentiation is not normally commented on when computing apps and it is important to understand whether the temporal dimension and reaction time is considered in the use of educational apps.

This context generates an autonomous learning style that does not harm the stages of the language learning process (Hidayati & Diana, 2019). In a more limiting line and as previously mentioned (Hanson & Brown, 2020), the apps (for language teaching) on the market are less pedagogical and do not provide enough opportunities to learn writing/reading/phonology skills using language games, being limited to learning about language. Another problem is the absence of the hybrid aspect of the devices, because if an application does not generate collaborative learning opportunities (which can occur in the classroom or among peers), it is neither complete nor successful.

The hybrid dimension should also be mentioned in the light of opportunities for family interaction (Shadiev et al., 2020). The methods included in MALL are more positively correlated with performance and motivation (intrinsic and integrative), when there is room for a family context, that is, applications and technology that promote the family's emotional investment in the user's learning path. Another advantage that can be seen through a comparative analysis of mobile devices and paper manuals is related to the low economic cost of accessing such platforms. Manuals and books in physical format are much more expensive and are not interactive and cutting edge like an app, which is always evolving (depending on its author and the goals of the app).

Access to exponential content on small screens is no longer seen as a disadvantage (Ali & Miraz, 2018), with this limitation pointed out in previous studies taking a back seat. The capacity of application storage has been increased so that learners can access their learning path over time. Stipulating a number of working hours associated with a device in MALL is not easy as learning becomes autonomous and emergent.

According to the learners' needs, the process will vary in terms of the number of hours. It is expected that the school population will have a greater number of working hours because they have a parallel and mandatory pedagogical plan at school. The function of the mobile instruments is to complement the school syllabus of the basic and secondary education levels. The number of working hours, therefore handling and accessing the applications, will be much higher in adult student populations (university populations) and non-student adult populations (Botero et al., 2018).

The number of working hours will also be influenced by the levels that learners want to focus on in their selective learning. The levels most assured by the MALL method are vocabulary and phonetics. They are also the most analysed by research (Afzali et al., 2017). Afzali et al. (2017) reiterated another meta-analysis through indexing bases such as Science Direct, Wiley, and Scopus and found that data from several countries confirm that learning other languages and respective vocabularies has greater gains with digital inputs (from the MALL method) than with physical inputs (flashcards, for example). One of the biggest limitations of these studies is the use of English as the MALL's target language. Few other languages have been analysed in the same mobile context as the case of European Portuguese and its most present variant in apps: Brazilian Portuguese.

#### *New Technology for Education in and out of Classroom: Immigrants*

Despite the positive correlation between gamification and language learning, the scientific information we have on this gamification within MALL is still not enough, as attested by the study by Shortt et al. (2021). The authors found that the literature published between 2012 and 2021 on the best-known app – Duolingo – does not recognize the importance of the app's core functionality and gamification – effective learning or proficiency. The observed results focused more on the construction of the application than on the objectives that should interest users the most and the limitations of the application are worrying, as it was analysed after eight years on the market.

With the objective of enabling organized learning and with an empirical background, the GoGenius mobile application was developed - for learning European Portuguese - with its trademark registration legally confirmed within the scope of the European space in October 2021. It will be important to evaluate the effectiveness and the use of the app to understand the tailor-made pairing between psychological and technological resources. By psychological resources, we mean the motivation and learning style of individuals. There are three types of motivation: intrinsic, extrinsic, and instrumental. By learning styles, we mean visual, auditory, and kinaesthetic styles.

According to a previous empirical study (Figueiredo, 2008; Figueiredo et al., 2019), immigrants from the American continent prefer to learn Portuguese as an L2 using the visual style (image input). On the contrary, immigrants from Asian countries prefer the kinaesthetic style (here the physical handling of digital devices matters in view of this evidence).

In linguistic terms, the GoGenius app, available for Android, tablets and computers, aims to support the learning of European Portuguese by foreign populations from all over the world, including Portuguese immigrants, refugees (in Portugal) and 2nd generation Portuguese emigrants. It is also for Portuguese children in the first two years of the 1st cycle (Grade), in Portugal, and children at the same school levels in Portuguese-speaking countries.

All age groups are included, and the contents and didactic challenges were prepared for users who have proficiency below level B1 and for school audiences (as an essential pedagogical tool for tailored learning). It should be noted that before the construction of the app, an empirical study was conducted to define, in the app, the hybrid contents and pedagogical organization for the acquisition of competences in different stages and areas. This was done to understand the characteristics of the target audiences and their difficulties.

In terms of difficulties, it is important to mention that proficient mastery of the official language of the country where one life (and the acquisition of foreign languages) has been increasingly demanding so that skills are equivalent between groups in the same labour market and also considering the cross-cultural dimension of markets. In other words, linguistic proficiency in a language will influence the individuals' performance and daily personal and professional motivation, being in direct competition with other individuals from the same territory and from other countries (regarding the national or international dimension of companies and even current education systems).

Individuals who are deprived of access to language learning opportunities, especially through multimedia devices, may be compromised with regard to the ideal time for the learning of skills to occur. There is a specific period for language development and it has been extended (in terms of age group) thanks to the use of computerized (and mobile) models for this competence development. More recently, mobile models, not only restricted to computers, have had a greater effect on the speed of learning (Lee et al., 2014).

In terms of the characteristics of the target audience, it was important to have conducted a previous empirical study to ascertain the learning styles and motivation (as well as attitudes) of different minorities facing the learning of Portuguese and other languages as a Second Language. From this study, it was found that the way in which the didactic sequences are structured influences the motivation to continue to attain the levels of competence acquisition.

### **Theoretical Framework**

Visual and auditory stimuli are crucial and that's why the GoGenius app took two variables into account: the entire layout should follow the current models of social networks and similar apps (for other target languages) for greater engagement; the main instructions are expressed in ten languages, nine of which are the mother tongues most representative of immigrant groups. Combining these variables, it was possible to meet the specificity (and limitation) presented by relational mobility. This concept has already been presented in the previous section and should be reinforced. Relational mobility involves aspects of acculturation that education systems and current instruments do not

always take into account. As in the case of stimuli that learners identify with and that provide intrinsic motivation for language learning.

The aforementioned study helped to determine the difficulties expected by immigrant groups and linguistic minorities, so the application contains an organized scheme of thematic activities focused on reading, writing, and, above all, on oral comprehension. The latter contains modified exercises in all thematic modules, given the greater difficulty observed in phonetics during the period of acquisition of an L2 and FL (Figueiredo et al., 2016). The selection of topics sought to be familiar to users so that exercises would not be avoided due to constraints or cultural and ethnic differences. On the other hand, the indicators of motivation and attitudes towards L2 learning (Figueiredo, 2008) observed in our preparation study with Portuguese and Catalan samples (Figueiredo et al., 2019), indicated that students (specifically non-adult school population) prefer to learn linguistic content that is close to the topics covered in the classroom.

However, the fact that we evaluated 305 Portuguese and 279 Catalan samples (regarding immigration and L2 learning) allowed us to understand aspects of motivational differentiation regarding the two hosting contexts and conditions to support language education and inclusion of immigrant students (Figueiredo et al., 2019). With regard to motivation and attitudes, in the study with the Portuguese sample (motivation towards learning a Second Language), the group of individuals born on the Asian continent had the highest motivation index, which can be explained by the distance between their mother tongues and L2 Portuguese, in addition to the difficulty in integration itself, which may be motivating their sense of learning, which they internalize as necessary and desired for their development.

On the other hand, the group of American (Portuguese) subjects denoted a very low level of motivation in L2 learning, which contrasts with their results obtained in the self-assessment in proficiency (in the same study that was conducted, Figueiredo, 2008, 2010, 2022). The feeling of mastery in L2 (Portuguese) may be influencing the motivation levels of American students, who do not necessarily seem very motivated as they have already fulfilled the minimum requirements of the linguistic task.

Still based on conclusive clues from experimental studies conducted in Portugal and Barcelona (with student populations between 7 and 17 years of age), the gender variable influenced the level of motivation only in the sample of Portuguese immigrants: female children showed a greater predisposition to learn L2 (Portuguese, which did not happen with Catalan children) (Figueiredo, 2010).

Comparing immigrant minorities and their host countries, we conclude that Portuguese immigrant children are less motivated to learn Portuguese than adolescents. The scenario is different in the Catalan sample, as children denote greater motivation. However, in general, the items of the instrument regarding the assessment of motivation, attitudes, and anxiety (Figueiredo et al., 2019) revealed that the Portuguese show higher levels of motivation and attitudes towards the language, classmates, the teacher, and the feeling of acculturation. Our previous research also tested what skills generate more or less difficulty in Portuguese second language learners. This evidence was the basis for the architecture of the gamification in this mobile app. With no research evidence and validation of the linguistic tasks, we would not be able to proceed with the model and original technology output presented in this study.

### *Constructivist Assumptions of Educational Technology*

Thus, we developed another previous empirical study with 108 immigrants in order to understand the top priorities for the second language learning in what regards the Portuguese as target language (Figueiredo, 2022). Based in that study, we structured this mobile app to respond, faster and in validated way, to the emergent skills that second language learners need when entering in the country. The tasks focused on vocabulary decoding and naming, verbal analogies, phonetic training and decoding, dichotic listening for foreign accent detection, and reading of texts, among other tasks.

GoGenius challenges traditional teaching models and language acquisition strategies through means that modify and motivate the development of competences in European Portuguese. On the other hand, it challenges current apps that are essentially behaviourist (based on spaced repetition and fast vocabulary retention), which compromises long-term learning (Shortt et al., 2021). Apps such as Duolingo were tested and the limitation related to the lack of feedback during tasks was noticed (Loewen et al., 2019; Marques-Schafer & da Silva Orlando, 2018).

Hence, the GoGenius app has solutions in all exercises and ways that allow users to understand which aspects they need in order to improve their competence. There are no in-app interaction chats as in the forums of apps like Duolingo, precisely to avoid competitive learning that is undesirable for motivated learning (Shortt et al., 2021). It is also interesting to analyse the impact and effectiveness of the use of the GoGenius app by registered users all over the world, as well as to define indices of motivation and attitudes towards FL and L2. It will be important to understand the difference in motivation and attitude indices in the context of regular learning in a traditional classroom and compare it with blended learning with gamified pedagogical materials. And, also, to assess students' anxiety while using this form of game learning.

To this end, data collection requires access to large-scale servers that are associated with mobile applications. Developing apps for this target audience with a pedagogical and cross-cultural function implies having a database. For this reason, a database was guaranteed and is currently being filled automatically every time users access the modules. The anonymity

and usage of user data are fully ensured in accordance with the principles of the Declaration of Helsinki and its later amendments or comparable ethical standards.

The database will allow us to access data from users around the world to understand which games have the highest access and highest scores, as well as access times. Psychological analyses will have to be judicious by choosing a sample from the database and using instruments to measure variables such as motivation and learning styles, in addition to competence.

Very recent studies (Ellis, 2019) found that the evidence regarding the impact of the use of smartphones and respective applications on the subjects' behaviour is not solid. Psychometric assessments that have recently required the use of technology (mobile phones) do not have negative consequences for users (Ellis, 2019). On the contrary, Horwood and Anglim (2019) found a negative correlation between mobile phone use and mental health levels such as self-esteem, autonomy and affection. Waris et al. (2019) confirmed how the time spent in electronic games involving visuospatial skills among others is negatively correlated with success in performance and working memory.

The issue related to the time and frequency of use of games, in this case, apps for learning, should also be brought to light in this study and project. Learners should not spend more than 15 to 20 minutes daily handling apps within the specific scope of the MALL. And because we refer to the MALL context, we have to focus on the concept of serious games (games aimed at education and learning) and their implications obtained by research that analysed how gamification affects mental health and the performance of subjects. In this context, Baptista and Oliveira (2019) found that this type of game (in which language teaching applications are included) has a positive and significant correlation (proportionately) with engagement and satisfaction on a daily basis. Since we are referring to mental health and to the inclusion (related well-being) of immigrants and foreigners in and out of schools, it is important to understand how our app – GoGenius – is aligned with the goals of the United Nations (2030).

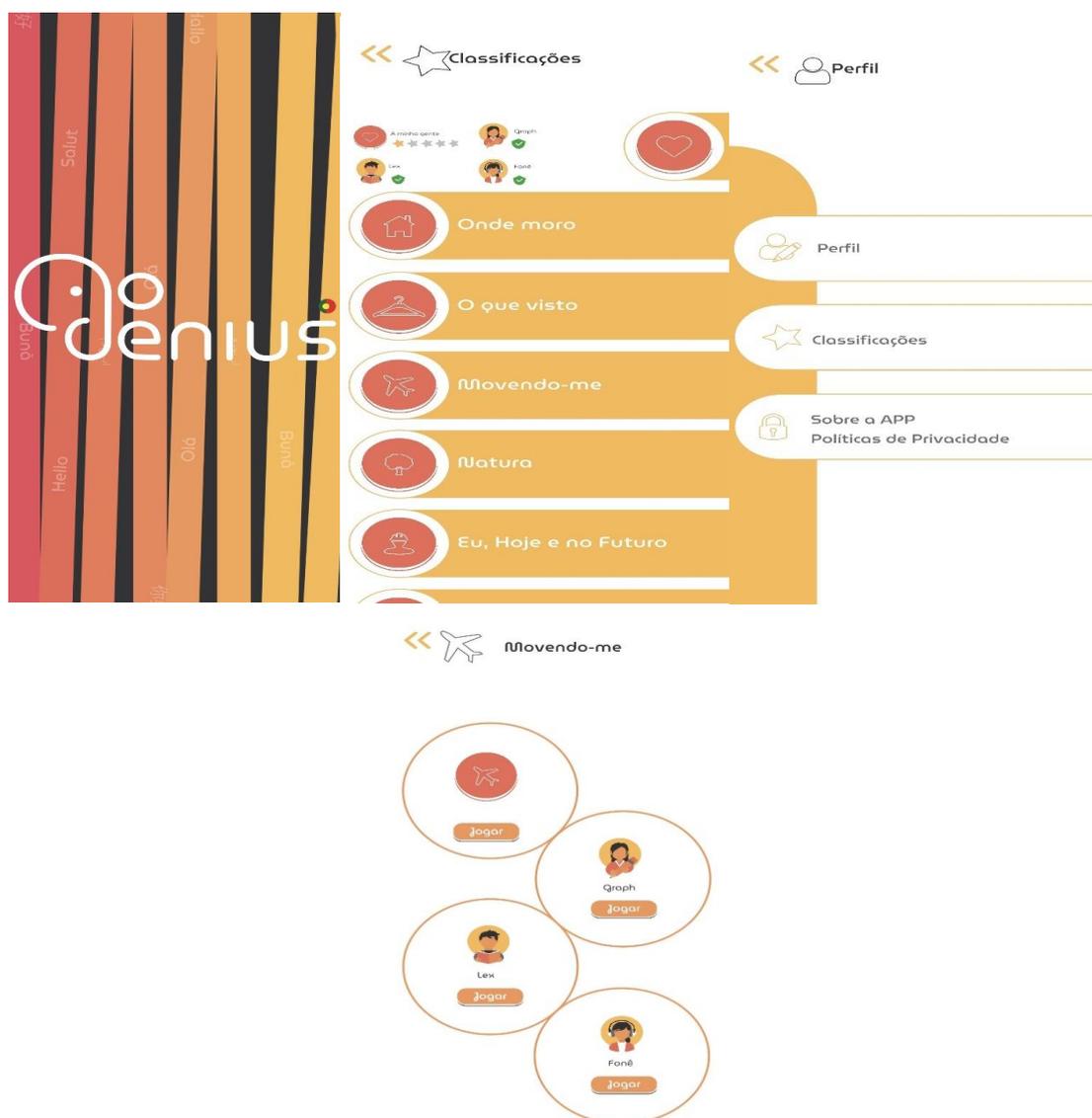


Figure 1. Illustration of Screens From the App GoGenius

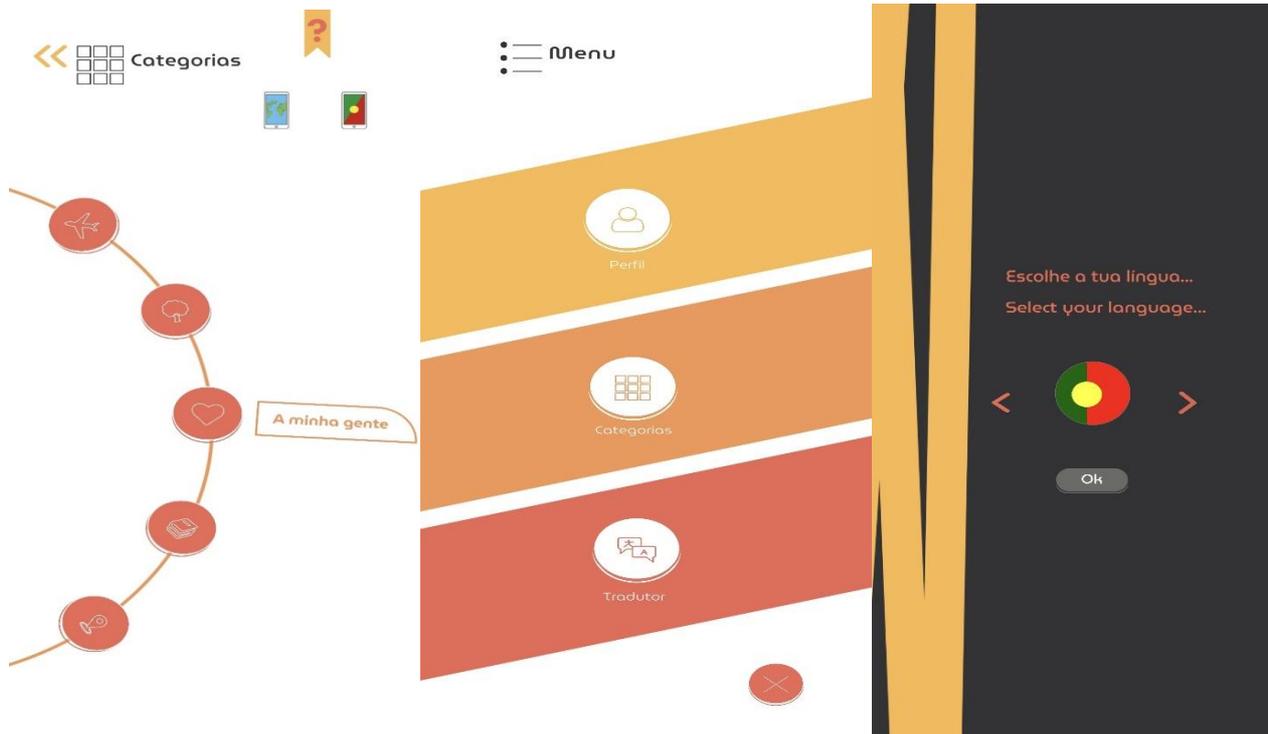


Figure 2. Illustration of Screens From the App GoGenius

#### *The United Nations Goals: The Relevance and Practical Implications of this Educational Tool*

The social and educational main concerns and objectives of this project are in accordance with the goals of UN Sustainable Development Goals (2030 Agenda), specifically considering characteristics of the Goals 1, 4, 10, 16 and 17. The outcomes of this project promote the good health, well-being, and inclusion by language education of populations attending their differences and origins, education quality, prosperity, reduced inequalities, economic and decent professional growth, peaceful and resilient society, and lifelong learning. These goals are aligned with the challenges of immigrations and peace threat that we are living with in the war conflict Russia-Ukraine (despite active war conflicts in other countries that trigger more immigration and asylum-seeking).

To put an end to poverty and ensure the education of quality, as well enhancing full participation and access to the host society, one of the main goals of this project is to develop and validate a comprehensive and accurate learning platform - mobile-assisted application with personalized usage - that ensure affordable, easy and equal access to the learning of Portuguese and based literacy skills. That application is to investigate, to identify and to develop and compute profiles of immigrants and minorities, in Portugal. Concerning the well-being of populations, these specific groups will be examined regarding psychological and affective variables crucial for the adaptation to the host country and that are not yet completely understood. Migrant groups are the main concern regarding their inclusion and mobility.

This project will generate a translational research and outcomes that are assumed as a model for European Union regarding the current society' conflicts and the immigration policies. The app as the core of this research has an educational, social, and economic impact for the society. It also should be noticed that the task plan is aligned with the promotion of inclusive societies that are advocated by the European models that determine the sustainability through the integration and well-being of migrant groups and continued education. Online platforms help to eradicate poverty, lack of education opportunities, avoid the school drop and enhance the self-esteem and motivation of linguistic minorities and social groups merged: immigrants, refugees, foreigners and asylum seekers.

Despite the importance of existing mobile apps and computational models, research does not point to the existence of a sufficient number of digital platforms supporting learning new languages at various ages and they do not focus on the question of their effective validity (for learning) for their users. In European host countries, academic difficulties are linked to students' and parents' lack of L2 proficiency, the country's educational resources, and insufficient research on the immigrants' and refugees' cognitive profiles and learning needs (Figueiredo et al., 2016).

Furthermore, we take into account that several groups of immigrants originate in least developed countries with a major distance between their educational systems and ours. To ensure the sustainability of cities and institutions in Portugal and Europe, it is important to ethically consider those differences, as stated by the American Psychological Association when evaluating minorities.

### Conclusion

On the one hand, the literature review ensures MALL is one strong solution for flipped approach, considering the blending method of work for students. On the other hand, in the context of classroom methods and Education the most recent and popular articles (Heggernes, 2021; Li et al., 2019; van Alten et al., 2019; Zainuddin et al., 2020) are related to interculturality and foreign language learning. Attending to the very current scenario in Europe, due to the Russo-Ukrainian war, it is important to plan new forms of inclusion and adapt existent materials for the non-natives' education. Also, to reduce the difficulties generated by forced migration caused by conflicts in foreign countries. We conducted a literature analysis in this theme and, simultaneously, we presented a concrete tool for second/foreign language learning, focusing the European Portuguese. And the new challenges of immigrants and refugees. The reference to previous studies is based on the evidence that both in Education and Psychology there is insufficient research on the cognitive and educational characteristics of immigrants and refugees in Portugal to enable a clear understanding of how the learning and adaptation of these populations occur and can be optimized. There is no known assisted mobile app for the teaching and learning of (European) Portuguese as Second Language (L2) that contributes to the integration of cognitive structures (i.e., organization of thoughts regarding knowledge and information, reasoning). With this project, pedagogical issues will be answered and educational outcomes are in focus.

### Recommendations

Further studies on educational research, in this field, should replicate similar mobile applications to assure more dynamic and sensorial methodologies in and out of classroom. Languages other than English should be valued for these mobile tools considering that new generation of immigrants is changing the trend of languages education. The psychosocial adaptation and the educational success will depend on this. Teachers and educators, as well researchers, are responsible for the language support as a first step for the educational inclusion.

### Limitations

This mobile model to assist learning in the European education context mentioned, at this time, needs more examination and analysis concerning the data stored at the app server. These data will inform, in a comprehensive way, in what regards the contents preferred by users, the time spent in specific didactic games, and the earning concerning the learning process of the individual. To achieve this further study, more users need to access and to learn through the app and considering that the Portuguese Language is one of the most spoken languages in the world. Inclusion depends on the acknowledgment of this type of mobile platform because the first step for the education of non-natives is to supervise the language acquisition and its social meaning.

### Ethics Statements

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The Ethic Committee of Universidade Autónoma de Lisboa granted the approval as well the Foundation for Science and Technology.

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### Conflict of Interest

No conflicts to be declared,

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