

Evaluation of the Usability and Usefulness of the *Vocal'iz* Mobile Application in a Population of Teachers

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Abstract

Background: Although mobile health (mHealth) tools for vocal health are increasingly used, their scientific evaluation remains limited.

Objectives: To assess the perceived usability and usefulness of the *Vocal'iz* mobile application among teachers. To examine the relationships between these outcomes and individual factors such as age, Voice Handicap Index (VHI-30), health literacy, and digital literacy.

Method: Thirty teachers participated in the three phases of our study: (1) completion of a personal data questionnaire, the VHI-30, the Health Literacy Scale, and the Digital Literacy Scale; (2) 10 days of independent use of the application; and (3) completion of the System Usability Scale (SUS) and section F of the Mobile App Rating Scale (MARS) to assess the app's usability and perceived usefulness. A one-sample *t*-test compared the participants' SUS score to the reference value of 70. A Wilcoxon signed-rank test compared the MARS section F score to the reference value of 3. Correlation tests were conducted between the SUS and MARS scores and the individual factors.

Results: The mean SUS score (76.67, SD=11.55) and the mean score for MARS section F (4.03, SD=0.74) were both significantly higher than the reference values, with medium to large effect sizes. There were no significant correlations between usability or usefulness and the individual factors.

Conclusions: The findings suggest that teachers rated the *Vocal'iz* app highly, demonstrating its good usability and positive perceived usefulness. The app's potential as a preventive tool warrants further evaluation in more diverse and larger populations, as well as an assessment of its effectiveness.

Keywords: mHealth – Teachers – Health promotion – Mobile applications – Voice disorders

1. Introduction

The integration of mobile health (mHealth) applications into healthcare has grown rapidly in recent years.¹⁻³ Defined as the use of mobile electronic devices to deliver health-related services and information, mHealth offers accessible solutions for health management. mHealth enables patients to better manage their health every day and gives them greater autonomy. The goal is to optimize the patient–healthcare professional relationship rather than replace it.⁴ These tools have shown promise across various domains, including prevention, diagnosis, and therapy, fostering patient engagement and making patients active participants in their own care.^{5,6}

Several mHealth tools have been specifically developed to address vocal health concerns. mHealth applications have been designed for either preventive or therapeutic purposes, addressing areas such as screening for voice problems,⁷⁻⁹ vocal health promotion,¹⁰ therapy, and self-monitoring.¹¹ Vocal health is particularly important for professionals at high risk of voice disorders, such as teachers, who experience vocal fatigue and dysfunction at significantly higher rates than the general population.¹²⁻¹⁴ A systematic review of 14 publications revealed that the prevalence of vocal fatigue among teachers is estimated at between 42% and 92%.¹³ In this group, vocal disorders are reported two to three times more frequently than in other professions.¹⁵ Such disorders impact workplace productivity, contributing to increased absenteeism, medical expenses, and economic losses.¹⁶ Workers at risk of voice disorders would receive real benefit from mHealth tools.

The adoption of these tools depends on several factors that can be categorized based on their nature.¹⁷ Tool-related factors include the perceived usefulness of the application, its ease of use, data-related concerns such as security and privacy, and associated costs. In addition, factors related to sociocultural aspects, including social influence, language, and cultural considerations, as well as demographic elements such as age, gender, socioeconomic status, education, and profession, play significant roles in determining whether these applications are adopted. On the other hand, user-related factors include personal characteristics such as attitudes, motivation, digital literacy,¹⁸⁻²⁰ and health literacy.^{21,22} Digital literacy can be defined as individuals' capacity to use digital technologies and understand their risks. It encompasses not only the applied technical skills necessary to use and access the internet but also the ability to critically and confidently engage with the online environment.²⁰ Health literacy, on the other hand, refers to individuals' ability to obtain, understand, evaluate, and use health information to make informed decisions and daily choices concerning disease prevention, health promotion, and maintaining or improving their quality of life.²³

It is important to note that mHealth in the voice domain is not limited to mobile applications. It also includes the use of mobile devices for ambulatory phonation biofeedback.²⁴ This approach is not new, as mobile technologies have been explored in voice therapy for many years; for example, studies using MP4 players were reported by Van Leer and Connor as early as 2012.²⁵

Several tools dedicated to voice have been developed and studied. Within a telepractice-based prevention model, *VoiceEvalU8*²⁶ supports regular self-assessment and longitudinal monitoring of vocal symptoms and vocal behaviours in a broad population of voice users, including clinicians, researchers, students, and individuals involved in voice training or voice care. It facilitates early awareness of vocal changes and remote preventive guidance, and exists only in English. In contrast, *VoicePractice*²⁷ is a therapeutic mobile application designed to support structured, clinician-guided voice practice between therapy sessions within telepractice and

hybrid care models. It enables repeated daily practice with feedback and monitoring, helping reinforce vocal targets and promoting skill generalization beyond the clinic. The application interface and instructional content are currently available in English only. Other applications, such as *Health and Voice*,¹⁰ are designed to promote vocal health among teachers by giving them education, self-assessment, and management strategies. This tool can be accessed in Portuguese and English via the study university's website.²⁸ It offers five activities: quizzes, myths and truths about the voice, a vocal habit-sorting game, a virtual classroom simulation, and video lessons.²⁹ It has been evaluated for usability and acceptability among 277 elementary school teachers, revealing its potential to improve users' knowledge of vocal care. Other tools, such as *VoxPedia*,³⁰ use gamified quizzes to educate users about vocal hygiene, while applications like *Vox4Health*,^{7,31} which serve as screening tools, incorporate acoustic analysis to detect vocal disorders in both normophonic and dysphonic individuals. Similarly, *Q-Voz*³² focuses on therapeutic interventions by providing guided exercises and tracking patient progress. For professionals seeking preventive solutions, *VoiceGuard*³³ emphasizes vocal education and regular monitoring.

Addressing a different aspect of voice therapy, an iOS app³⁴ was specifically designed to improve adherence and provide external motivational support. Targeted at individuals with adducted hyperfunction, it integrates three evidence-based functionalities: daily reminder notifications to encourage practice, instructional recorded audio guides for technique recall, and Cepstral Peak Prominence (CPP) feedback. Although the application was intended to support both adherence and motivational engagement, outcomes indicated a significant improvement in adherence and practice frequency, but no significant effect on users' intrinsic motivation or goal commitment, possibly due to the lack of video modelling or peer-based reinforcement mechanisms. The app's design specifically targets extrinsic behavioural support to overcome logistical barriers (forgetting to do exercises, technique recall difficulties) rather than addressing intrinsic motivational factors.

Voice Analyst^{35,36} was designed for individuals with neurological impairments or dysphonia, transgender individuals, and singers or performers. It provides visual feedback for voice therapy, allowing users to track and adjust pitch, volume, and phonation duration. Similarly, *VoiceMeter Pro*^{36,37} offers real-time visual feedback, supporting users who need continuous voice monitoring, including children. Both apps assist in voice modulation and therapy, but professional supervision is recommended for effective utilization. To date, no scientific studies have been conducted on these two applications.

This paper focuses on *Vocal'iz*,³⁸ a mobile application designed to promote vocal health by optimizing the user's vocal potential and preventing voice disorders. It was developed in 2017 in France by MGEN (Mutuelle Générale de l'Éducation Nationale), a French mutual health insurance organization, through a collaboration between the National Federation of Speech Therapists in France (FNO) and the Institute for Research and Coordination in Acoustics/Music (IRCAM). The content of the app's activities was generated by speech therapists from the FNO, and the acoustic analysis algorithms were developed by engineers from IRCAM. Since many MGEN members are professional voice users, such as teachers, the organization has developed a specific initiative dedicated to voice health. The app is freely available for public use in French on both iOS and Android platforms (<https://www.mgen.fr/vocaliz>).

Vocal'iz highlights the following features: self-assessment of daily vocal condition, vocal identity card, analyses, exercises and articles (see Appendix A). The self-assessment is

conducted with a short introductory questionnaire aimed at identifying potential vocal fragility. Individuals who present symptoms of voice disorders are encouraged to consult a specialist. The vocal identity card allows users to create a vocal imprint at a specific time, based on self-assessments and voice recordings of them reading a text and performing an ascending glissando. The analyses feature provides acoustic voice measurements based on text readings or spontaneous speech, such as fundamental frequency (f_0) and intensity. The analysis feature also provides speech measurements related to speech rate and pauses. The results of the quantitative acoustic measurements, together with the timbre representation, can be found in the My Voice subsection of the Vocal Profile section. Finally, each user is given a set of exercises tailored to their vocal imprint and daily self-assessment, promoting targeted practice. Before starting an exercise, the app presents the objective, benefits, recommended location and environment, and proper posture. Typically, users have access to a demonstration video featuring a vocal coach. The exercises are divided into eight categories: vocalization, vocal range, posture, breathing, relaxation, intonation, warm-up, and voice placement in the resonators. The app is updated regularly, and new exercises were added in 2026. Additionally, since *Vocal'iz* emphasizes the importance of understanding how one's own voice works, whether spoken or sung, the user has access to articles categorized in six sections: vocal functions, vocal health, different uses of the voice, vocal care, a general section on ideas related to the voice, and finally, elocution. The app encourages user autonomy by providing education and preventive care strategies through its exercises and articles, aligning with the broader mHealth goal of enhancing self-monitoring and daily self-management, rather than replacing professional support. *Vocal'iz* presents a unique combination of multiple functionalities that are found separately in other applications, such as vocal profile, real time feedback, and videos similar to those in MP4 players. Additionally, it includes informative articles on voice, is available in French, and can be downloaded for free, which is not always the case for existing voice applications.

So far, the *Vocal'iz* mobile application has not yet been studied scientifically, either in terms of user perception or in terms of efficacy in voice problem prevention. This study is a first step toward filling this gap. The objectives were to assess teachers' perceptions of *Vocal'iz* in two key areas: usability (objective 1) and usefulness (objective 2). Usability refers to the ease with which a product or system can be employed by specific users to achieve their goals efficiently, effectively, and satisfactorily.^{39,40} In this study, usability refers to how easily users can interact with the *Vocal'iz* app through voice activities and navigate its features. Usefulness, on the other hand, assesses user engagement and satisfaction, including their perceptions of the tool's utility.⁵ In other words, usefulness represents the extent to which *Vocal'iz* helps users achieve their goals. These concepts have also been evaluated in several voice-related studies of other voice-related tools.^{7,29,34,41} This work represents an initial verification phase that must be conducted prior to any study of *Vocal'iz*'s impact on vocal prevention.

2. Method

2.1. Ethical issues

This study was approved by the Ethics Committee of the Faculty of Psychology, Educational Sciences and Speech and Language therapy of the Université Libre de Bruxelles (Belgium) in March 2024 [file number: 1205/2023]. It was conducted in full compliance with the ethical principles outlined in the Declaration of Helsinki, ensuring the protection and respect of participants' rights and well-being. All participants provided digital informed consent after reading a complete description of the study. Participants did not receive any incentives for their

participation. The data were anonymized as soon as they were collected by assigning a code to each participant.

2.2.Participants

Thirty participants were included in the study. The inclusion criteria required participants to be teachers working at the preschool, primary, secondary, or post-secondary level, in either regular or special education settings, in French-speaking Belgium.

Exclusion criteria were defined in accordance with the legal notices and terms of use of the *Vocal'iz* application. Because the application is designed for preventive purposes, individuals presenting a physician-diagnosed vocal or auditory pathology at the time of the study, or who had undergone recent surgery involving the larynx or auditory system, were excluded. Teachers reporting vocal complaints were nevertheless eligible for inclusion, provided that no vocal or auditory pathology had been medically diagnosed.

Participants were also required to own a smartphone compatible with the application. Specifically, devices had to run at least iOS version 9.0 or Android version 4.4, as the *Vocal'iz* application requires these minimum system specifications.

2.3.Timeline of the study

On the first day, participants completed an online personal data questionnaire. They also filled out the Voice Handicap Index (VHI-30), the Health Literacy Scale (HLS) and the Digital Literacy Scale (DLS) to describe their health and digital literacy levels. After the completion of the questionnaires, an individual session was held on the same day via video conference to assist participants in downloading and familiarizing themselves with the *Vocal'iz* application. During this session, participants were introduced to the activity log, where they documented their use of the application. The log required users to note the date, duration, and specific activity they performed within the app. Participants were encouraged to use *Vocal'iz* daily for 10 days, at their own pace.

After 10 days of use, participants completed questionnaires addressing the two study objectives. These were the System Usability Scale (SUS) to evaluate app usability, and section F of the Mobile App Rating Scale (MARS), which assesses the app's perceived usefulness.

2.4.Online questionnaires

2.4.1. Personal data questionnaire

The personal data questionnaire collected sociodemographic information, including age, gender, and mother tongue. It also gathered details about participants' professional backgrounds, such as the level they teach (preschool, primary, secondary, or post-secondary), the subjects they teach, their work schedule (part-time or full-time), years of experience, and the average number of students per class. Teachers also provided information about their voice, including any specific vocal practices such as singing or theatre.

2.4.2. Voice Handicap Index (VHI-30)

The VHI-30⁴² is an established self-assessment tool used to evaluate the impact of vocal disorders on quality of life. It consists of 30 questions rated on a 4-point Likert scale (from 0 =

never to 3 = always); a score of 20 or more suggests a significant vocal problem affecting the participant's quality of life. The French version of the VHI-30 was used, as validated by Woisard et al.⁴³

2.4.3. Health Literacy Scale (HLS)

The HLS-EU-Q16, developed by Sørensen et al.²³ and validated in French,⁴⁴ measures individuals' self-reported difficulties in accessing, understanding, evaluating, and applying health information for decision-making related to healthcare, disease prevention, and health promotion. The scale consists of 16 items, with responses divided into two categories: "difficult" or "very difficult" (scored as 0), and "easy" or "very easy" (scored as 1). The total score ranges from 0 to 16. Based on the total score, health literacy is categorized at three levels: "inadequate" (0–8 points), "problematic" (9–12 points), and "sufficient" (13–16 points). Higher scores reflect a greater health literacy and are generally associated with better health outcomes.^{45,46}

2.4.4. Digital literacy scale (DLS)

We designed three custom-created questions to assess participants' comfort with new technologies and how frequently they used mobile apps, especially health-related ones. These questions used Likert scales to gauge participants' familiarity with technology and mHealth apps, with responses indicating varying levels of comfort and frequency.

The first question used a 4-point Likert scale to assess comfort with new technologies (from 0 = slightly comfortable to 3 = extremely comfortable). Both the second and third questions used a 5-point Likert scale to examine the frequency of general mobile app use and health-related app use, respectively (from 0 = never to 4 = every day). For the DLS items, see Appendix B.

2.4.5. System Usability Scale (SUS)

The SUS, created by John Brooke in 1986, evaluates the usability of systems or applications based on user satisfaction.⁴⁷ This scale includes 10 items (see Appendix C). Responses are given using a 5-point Likert scale ranging from 1 (=totally disagree) to 5 (=totally agree). The raw scores are transformed, and the final usability score ranges from 0 to 100. According to Brooke's classification, the SUS cut-off point is set at 70, with scores above this indicating acceptable usability.⁴⁷ Bangor et al.⁴⁸ sought to give SUS scores (calculated out of 100) some meaning by associating them with six descriptive adjectives, creating a more absolute evaluation scale. These adjectives are Worst imaginable (<35.7), Horrible (35.7–50.9), OK (50.9–71.4), Good (71.4–85.5), Excellent (85.5–90.9), and Best imaginable (≥90.9). For our study, we used the French version of the SUS (SUS-F) validated by Gronier and Baudet.⁴⁹

2.4.6. Mobile App Rating Scale (MARS)

The MARS⁵⁰ is a comprehensive tool designed to evaluate the quality of mHealth applications. It includes 23 items divided into five main sections, consisting of four objective subscales: engagement (A), functionality (B), aesthetics (C), and information quality (D), as well as a subjective quality scale (E), which asks the evaluator whether they would recommend and use the app in the future. The scale is scored using a 5-point Likert scale, ranging from 1 (=inadequate) to 5 (=excellent).

Given the general nature of the quality indicators for mHealth apps included in the MARS, an additional section (F) was added, focusing on application-specific features. It examines the app's perceived usefulness in relation to user knowledge, attitudes, and behaviours concerning a particular health topic.

The average score for sections A, B, C, D, and E is calculated by taking the arithmetic mean of the scores for each item. In this study, the same approach was applied to section F, which examines the app's perceived usefulness for user knowledge, attitudes, and behaviours regarding vocal health. Section F of the MARS includes the following six items. *Awareness* refers to the app's potential to raise awareness of the importance of avoiding vocal problems. *Knowledge* focuses on its ability to enhance understanding about voice-related topics. *Attitudes* pertain to its impact on changing vocal attitudes. *Behavioural Intent* examines the app's potential to boost motivation for engaging in vocal training. *Help-Seeking* evaluates whether the app encourages seeking additional help for voice rehabilitation, if necessary. Finally, *Behavioural Change* assesses how the app may promote positive behaviours related to vocal health and hygiene. Section F of MARS was the only section used in our study, as the SUS covers the other areas. This approach reduced attrition and concentrated on the perceived usefulness of *Vocal'iz* and its app-specific features.

An average section F score above 3 indicates that this specific aspect is at least sufficient and can be considered a strength of the app.^{51–53} For our study, we used the French version of the MARS.⁵⁴

2.5.Objectives, hypotheses, and related statistical analyses

For Objective 1, the hypothesis (H1) is that the usability of *Vocal'iz* is at least acceptable for teachers (score >70/100 on the SUS).⁴⁷ For Objective 2, the hypothesis (H2) is that the contribution of *Vocal'iz* is at least sufficient for teachers (score >3 on section F of the MARS).⁵⁰

For each of the hypotheses, the participants' results (SUS score for H1 and MARS section F score for H2) were compared to a single reference value (70 for H1 and 3 for H2). Normality was assessed before applying tests. For H1, normality was met ($p > .05$), allowing the use of a one-sample Student's *t*-test. Cohen's *d*⁵⁵ was applied to demonstrate the effect size. In terms of interpretation, Cohen's *d* values can be considered as indicating small (0.2), medium (0.5), or large (0.8) effect sizes.⁵⁵ For H2, the Wilcoxon signed-rank test was applied, as normality was not satisfied ($p < .05$). Rank Biserial Correlation $r^{56,57}$ was applied to demonstrate the effect size and is interpreted as follows: 0.1 indicates a small effect, 0.3 a medium effect, and 0.5 a large effect.

In addition to these two main objectives, we explored the correlation between age, VHI-30 score, health literacy, and digital literacy with both SUS scores and MARS section F scores. All correlations were performed using Pearson's correlation coefficient, except for the correlation with digital literacy, which was based on Spearman's rank-order correlation. A *p*-value of <0.05 was considered statistically significant. The statistical analyses were conducted using the statistical software Jamovi version 2.5.6.⁵⁸

3. Results

The study involved 30 teachers aged between 23 and 51 years ($M = 30.43$; $SD = 7.86$). As Table 1 shows, there were 27 women (90%), 2 men (6.67%; participants 1 and 2), and one non-binary

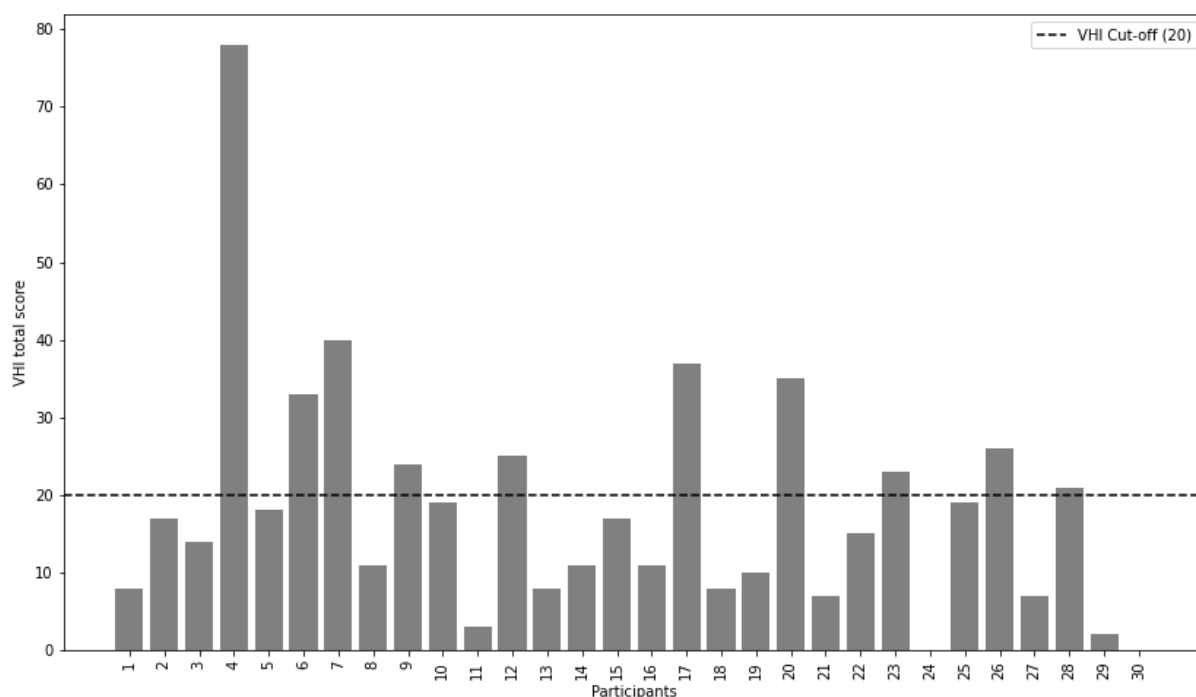
individual (3.33%; participant 3). Although all participants spoke French fluently, seven of them (23.3%) did not have French as their native language.

Regarding the educational level taught, 6.67% of them work in preschool, 36.67% in primary, 30% in secondary, 3.33% in post-secondary, and 23.33% combine two educational levels. As indicated in Table 1, the participants taught various subjects. Regarding work schedule, 70% were full-time teachers and 30% worked part-time. The number of students taught by each teacher ranged from 5 to 30 ($M = 17$; $SD = 6$). Teachers had between 1 and 28 years of teaching experience ($M = 7.08$; $SD = 7.99$).

Most participants (83%) did not engage in any specific vocal practice, while 3 practiced singing (10%) and 2 engaged in both singing and theatre (6.67%, See Table 1). The total VHI-30 score ranged from 0 to 78 ($M = 18.23$; $SD = 15.59$). The individual VHI-30 scores of all 30 participants are presented in Figure 1.

Figure 1

Individual VHI scores of all 30 participants

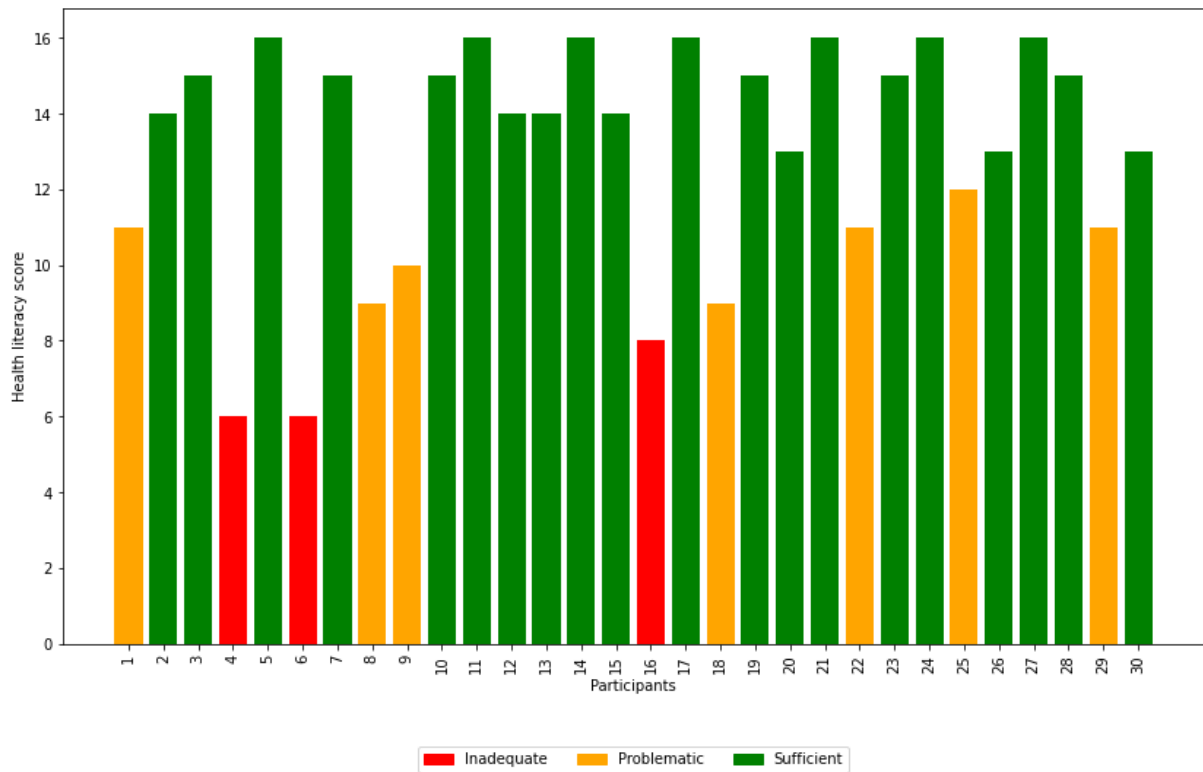


Note. Participants 1 and 2 = males; participant 3 = non-binary individual; participants 4 to 30 = females.

The health literacy scores ranged between 6 and 16 ($M = 13$; $SD = 3.04$). Figure 2 shows the HLS score for each individual, according to the three categories established by Sørensen et al.²³ Of the 30 participants, Twenty had a sufficient level of health literacy (66.67%), seven have a problematic level (23.33%), and three have an inadequate level (10%).

Figure 2

Individual health literacy scores of the 30 participants according to Sørensen et al.'s (2013) classification



Note. Participants 1 and 2 = males; participant 3 = non-binary individual; participants 4 to 30 = females.

Regarding digital literacy (see Table 1), most participants felt moderately to very comfortable with new technologies (respectively, 33.3% and 40% of the sample); 83.3% reported using mobile apps on their smartphone every day. However, 30% of participants reported never having used health-related mobile applications, while another 30% reported using them less than once per month.

Each participant used *Vocal'iz* for 10 days. The total duration of use ranged from 8 to 92 minutes ($M = 26.03$; $SD = 18.39$).

The descriptive results for *Vocal'iz* usability indicate a mean SUS score of 76.67 ($SD=11.55$) on a scale of 0 to 100. According to Bangor et al.'s⁴⁸ descriptive rating scale, this score falls within the “good” usability range. As illustrated in Figure 3, scores ranged substantially from 52.5 (OK) to 100 (Best imaginable).

For twenty-one teachers (70%), the usability score was above the cut-off (70). All teachers rated the usability of *Vocal'iz* as at least acceptable (Min=52.5). A one-sample t -test showed that the mean SUS score of 76.67 ($SD = 11.55$) was significantly higher than the cut-off value of 70 ($t(29) = 3.16$, $P = .002$), indicating that H1 is accepted since *Vocal'iz*'s usability is good. The effect size, measured by Cohen's d , was 0.62, which indicates a medium to large effect.

Table 1

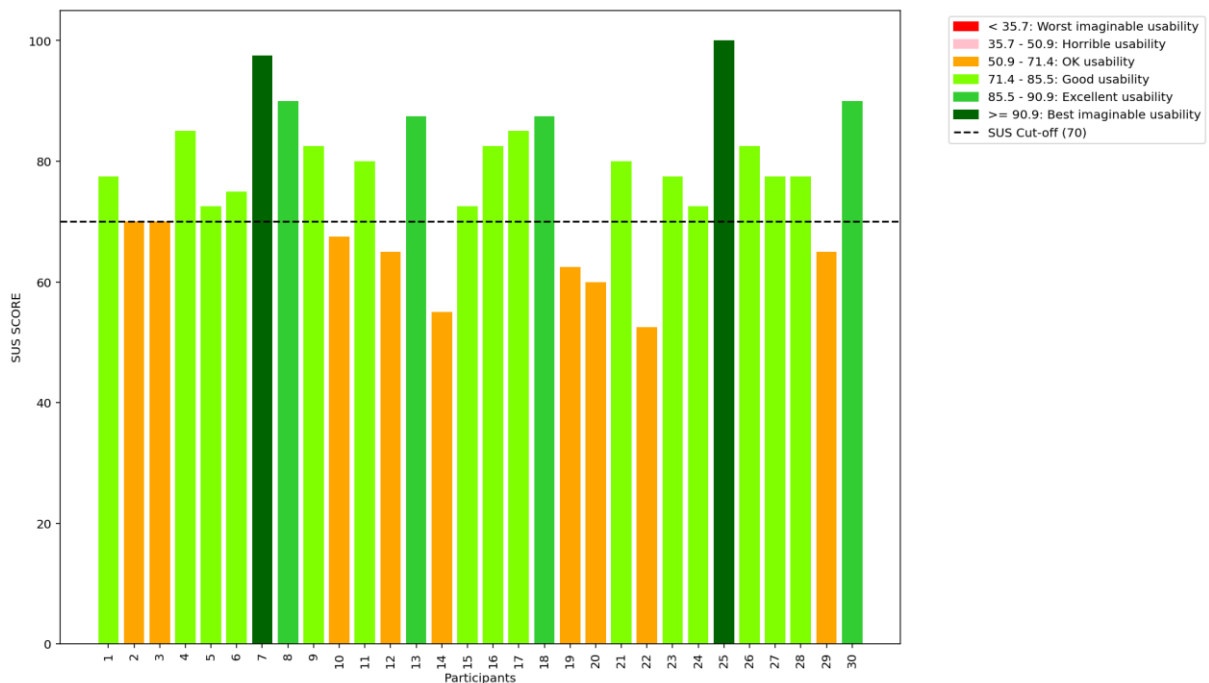
Description of the sample of 30 teachers enrolled in the study using sociodemographic, work, vocal practice, Voice Handicap Index, and digital literacy data

<i>Variables</i>	<i>n</i>	<i>%</i>
Sociodemographic		
Gender		
Women	27	90
Men	2	6.67
Non-binary	1	3.33
Mother tongue		
French	23	76.67
Arabic	5	16.67
Turkish	2	6.67
Work		
Educational level taught		
Preschool	2	6.67
Primary	11	36.67
Secondary	9	30
Post-secondary	1	3.33
Preschool and primary	3	10
Preschool and secondary	1	3.33
Primary and secondary	3	10
Subjects taught		
All basic subjects	8	26.67
French	4	13.33
English	2	6.67
English and Dutch	1	3.33
French and mathematics	4	13.33
Catholic religion	1	3.33
General awareness	4	13.33
French and religion	1	3.33
Philosophy and citizenship	1	3.33
Soil mechanics and geotechnics	1	3.33
Geography	1	3.33
Physical education	1	3.33
Mathematics	1	3.33
Work schedule		
Full-time	21	70
Part-time	9	30
Vocal		
Vocal practice		
Singing	3	10
Theater and singing	2	6.67
None	25	83.33
Vocal complaints (VHI>20)		
Yes	10	33.3
No	20	66.67
Digital literacy		
How comfortable do you feel with new technologies (smartphones, tablets, PCs)?		

Slightly comfortable	2	6.67
Moderately comfortable	10	33.33
Very comfortable	12	40
Extremely comfortable	6	20
How often do you use mobile apps on your smartphone?		
Never	1	3.33
Less than once per month	-	-
At least once per month	1	3.33
At least once per week	3	10
Every day	25	83.33
How often do you use mobile apps related to your health on your smartphone?		
Never	9	30
Less than once per month	9	30
At least once per month	6	20
At least once per week	3	10
Every day	3	10

Figure 3

Individual SUS scores of the 30 participants according to Bangor et al.'s (2009) classification



Note. Participants 1 and 2 = males; participant 3 = non-binary individual; participants 4 to 30 = females.

Concerning the perceived usefulness of *Vocal'iz*, the mean score for MARS section F was 4.03 ($SD = 0.74$), exceeding the cut-off of 3; individual scores ranged from 2 to 5. These results show that the teachers rated the specifics of the *Vocal'iz* application highly, indicating good acceptance and appreciation of its perceived usefulness for their knowledge, attitudes, and intentions regarding vocal behaviour. Concerning H2, the Wilcoxon signed-rank test confirmed that MARS section F scores were significantly higher than the cut-off of 3. Median score was 4.00 ($IQR = 0.55$; $Z = 435$, $P < 0.001$); Rank-Biserial Correlation $r_{pb} = 1$, indicating a large effect size. Therefore, the teachers perceived *Vocal'iz*'s as at least sufficient since the MARS section F score is significantly higher than 3. Figure 4 presents the teachers' results for each item of MARS section F.

Finally, no significant correlation was found between age, VHI-30, health literacy, or digital literacy scores and either SUS scores or MARS section F scores (see Table 2).

1. Discussion

The present study focused on *Vocal'iz*, an mHealth application dedicated to promoting vocal health and preventing voice disorders. Based on the perceptions of professionals at risk of voice disorders, the aim of this study was to evaluate two tool-related factors: the app's usability and its usefulness. To this end, 30 teachers completed an initial online questionnaire, used the application on their own for 10 days, and then filled out the SUS, assessing usability, and section F of the MARS scale, assessing the perceived usefulness of the application.

The results concerning usability showed a statistically significant level of usability, with a mean SUS score of 76.67. Some 70% of participants rated it above 70, which corresponds to "good" usability, according to Bangor et al.⁴⁸ *Vocal'iz*'s usability is comparable to that of certain other voice-related applications, such as the *iOS app for voice therapy adherence and motivation*³⁴ (SUS = 77.68). However, some other tools report higher scores, including the *Vox4Health* app³¹ (SUS = 81.3) and the *Health and Voice*¹⁰ (SUS = 81.9).

Of the 21 participants whose SUS scores were above 70, Two (7 and 25) rated the app's usability as the best imaginable. Participant 7, who reports vocal complaints affecting daily life (VHI-30 = 40), has a sufficient level of health literacy, is highly comfortable with new technologies, and uses mHealth apps daily, rated *Vocal'iz*'s contribution as very good (average MARS section F score = 5). Participant 25 has a marginal VHI-30 score (VHI-30 = 19) and limited health literacy, is moderately comfortable with new technologies, and uses mHealth apps weekly; she also rated *Vocal'iz*'s contribution as very good (MARS section F score = 5). Overall, these results suggest that *Vocal'iz* is well received by teachers.

Table 2

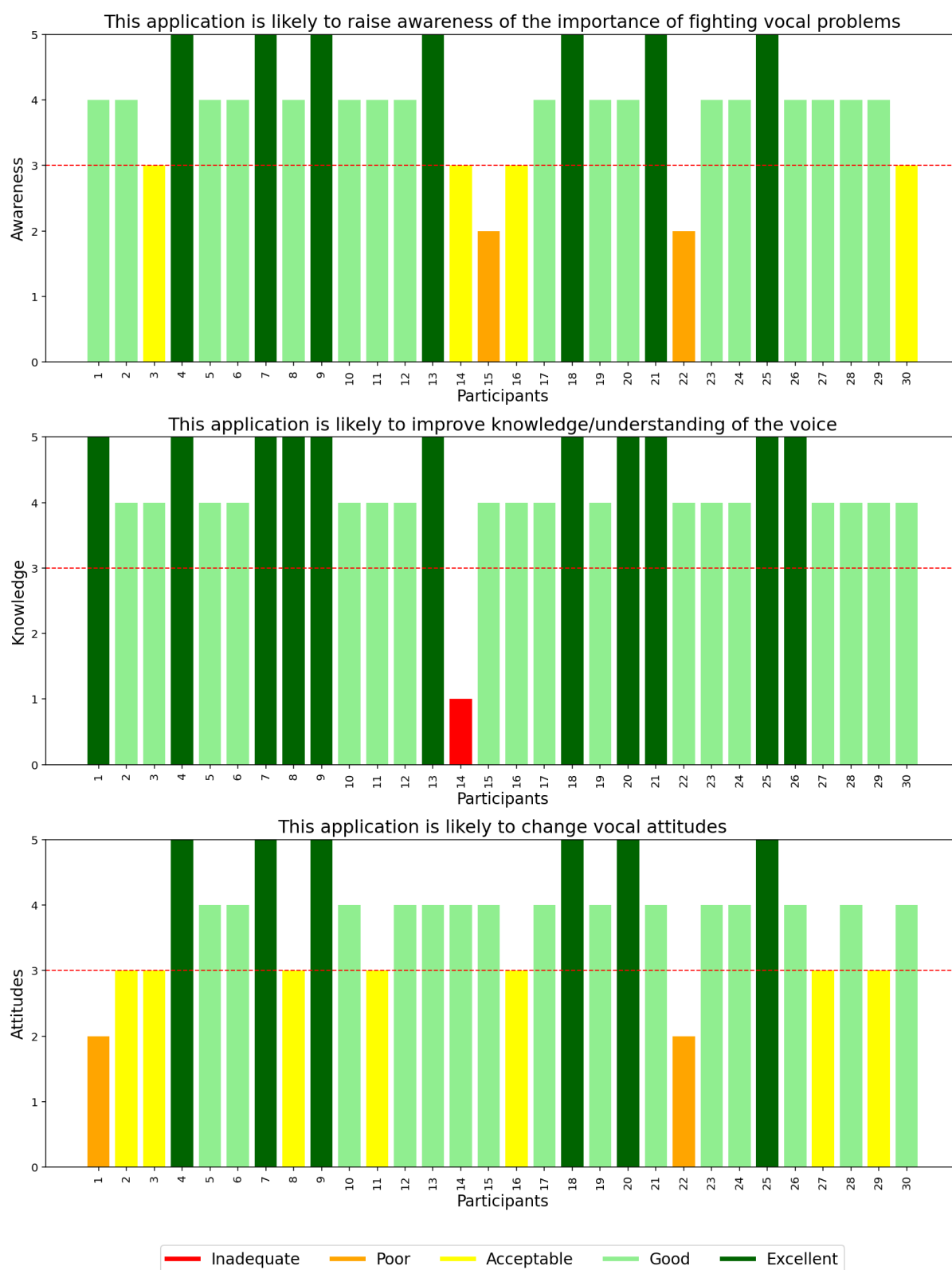
Correlations between age, Voice Handicap Index, health literacy, and digital literacy scores with both usability and perceived usefulness scores

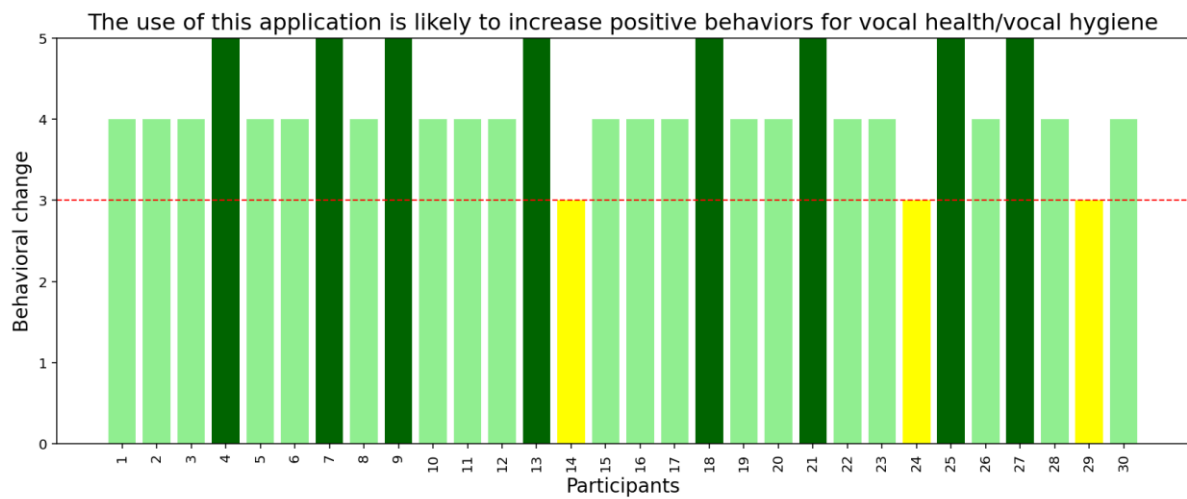
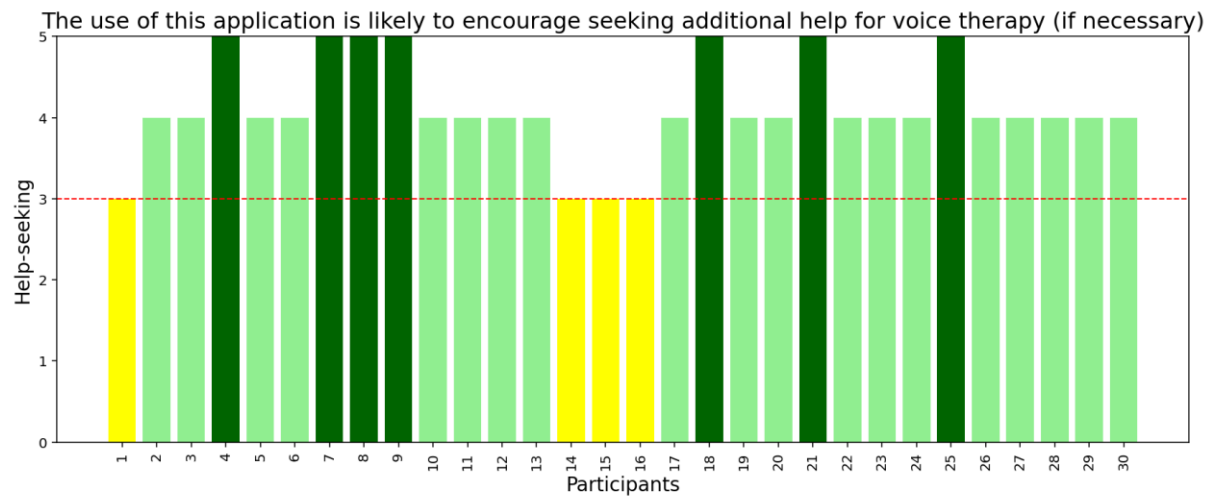
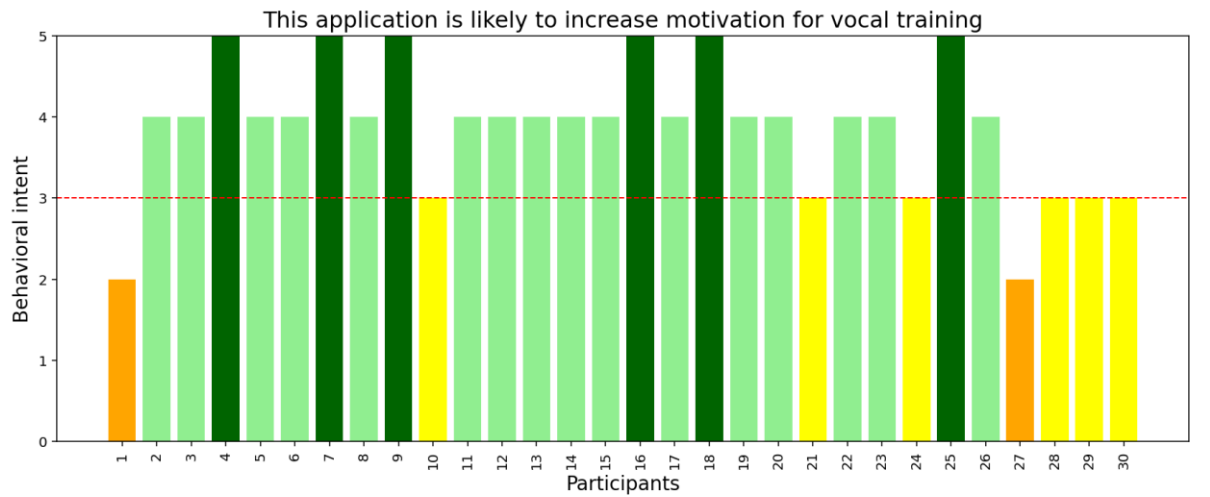
	Usability (SUS)	Perceived usefulness (MARS section F)
Age	$r = 0.09 [-0.28, 0.44], p = .64$	$r = 0.30 [-0.07, 0.59], p = .11$
Voice Handicap Index	$r = 0.05 [-0.32, 0.40], p = .81$	$r = -0.16 [-0.50, 0.21], p = .39$
Health literacy	$r = 0.05 [-0.32, 0.40], p = .79$	$r = 0.04 [-0.33, 0.39], p = .83$
Digital literacy		
Comfort with new technologies	$\rho = 0.09 [-0.28, 0.44], p = .62$	$\rho = -0.11 [-0.45, 0.26], p = .58$
Frequency of general mobile application use	$\rho = -0.27 [-0.57, 0.10], p = .15$	$\rho = -0.17 [-0.50, 0.20], p = .38$
Frequency of health-related application use	$\rho = -0.18 [-0.50, 0.19], p = .35$	$\rho = -0.24 [-0.55, 0.13], p = .21$

Note. r = Pearson correlation coefficient; ρ = Spearman's rho; p = p -value. The 95% confidence interval is indicated in brackets.

Figure 4

Scores of the 30 participants for each item in section F of MARS according to Stoyanov et al.'s (2015) method





— Inadequate
 — Poor
 — Acceptable
 — Good
 — Excellent

Note. Participants 1 and 2 = males; participant 3 = non-binary individual; participants 4 to 30 = females.

In this sample of teachers, there was no link between demographic factors and the perceived usability of *Vocal'iz*. Contrary to the literature reporting a negative relationship between age and SUS scores,^{48,59} we found no correlation between age and usability score. Moreover, the lack of correlation between VHI-30 scores and usability scores can be explained by the fact that most of our teachers did not report significant vocal complaints (VHI-30 < 20; see Figure 1). However, when we examined the descriptive results for VHI-30 and usability (Figures 1 and 3, respectively), we observed that, of the 10 teachers who had vocal complaints (VHI-30 score > 20), 8 rated the usability of *Vocal'iz* as at least good (SUS score > 70 for participants 4, 6, 7, 8, 17, 23, 26, and 28).

Regarding our second objective, *Vocal'iz*'s perceived usefulness for teachers' knowledge, attitudes, and behavioural intentions is considered a key strength. This finding aligns with the work of Stoyanov et al.,⁵⁰ as the mean MARS section F score exceeded 3. Since we did not find any studies on voice-related apps that used MARS section F, no comparison can be made with the literature.

Looking at the correlations, there was no link between age and *Vocal'iz* contribution. The literature does not report any studies investigating a potential correlation between age and section F of the MARS. Nor was there any correlation between VHI-30 score and the contribution of *Vocal'iz*, although most teachers with vocal complaints rated all items of MARS section F as at least acceptable (score > 3). Based on the results of participants 4, 7, 8, 26, and 28 (see Figure 4), we hypothesize that *Vocal'iz* is more valuable for professionals with vocal complaints. Further testing on groups of teachers with and without dysphonia would provide additional insight into *Vocal'iz*'s usability according to users' vocal status, as well as its perceived usefulness for vocal knowledge and behaviours.

Among the user-related factors examined, no significant correlation was found between health literacy and either the usability or perceived usefulness of *Vocal'iz*. Although the descriptive analysis suggests that individuals with sufficient HLS scores rated *Vocal'iz*'s usability and perceived usefulness more positively (see participants 7 and 13 in Figures 2, 3, and 4), statistical analyses on a larger sample of participants would be necessary to examine the influence of health literacy. Our descriptive results can be explained by the fact that individuals with sufficient health literacy levels tend to evaluate mHealth technology more positively, as they want to change their behaviours and habits, as well as improve their knowledge of health and diseases.⁶⁰ The insufficient health literacy scores of 10 participants could be correlated with poor health status.⁴⁶

Previous research has shown that users with low digital literacy feel less comfortable using mobile applications, particularly those related to health.⁶¹ In this study, most of the teachers had a good level of digital literacy and there were no significant correlations between digital literacy and either *Vocal'iz*'s usability or its perceived usefulness. According to Yoon et al.,⁶² a sufficient level of digital literacy requires prerequisites such as adequate language skills. As a sociocultural factor, language may therefore influence how users perceive and interact with mHealth tools.¹⁷ This may explain participant 14's unfavourable evaluation of *Vocal'iz*'s

usability (see Figure 3), as well as most items of MARS section F (see Figure 4): this English teacher is not a native French speaker. An interesting perspective for future research would be to examine users' digital literacy in greater depth using a specific tool, such as the Digital Health Technology Literacy Assessment Questionnaire.⁶² The lack of a French translation and validation prevented us from using it in this study.

1.1.Limitations

The study faced several limitations that should be considered. First, the sex distribution was not equal. There were considerably more female participants, which is consistent with their higher representation in the teaching profession and their significantly greater susceptibility to voice disorders.⁶³ Furthermore, the sample size of 30 teachers may limit the generalizability of the findings. Although this first study provides insights into users' perceptions of *Vocal'iz*, the relatively small sample size and the participants' narrow age range further restrict our ability to draw conclusions that would apply to a larger, more diverse group of people. However, the statistical analyses confirmed both research hypotheses with medium to large effect sizes. In addition, extending the period of *Vocal'iz* use could give participants more time to explore the application and offer more refined feedback. In this study, participants were asked to use the app daily for 10 days, with no specific duration of use prescribed per day; instead, participants were free to use it whenever their schedules allowed. Due to scheduling difficulties and limited availability, participants' total usage time of *Vocal'iz* ranged from 8 to 92 minutes. Although this variability may have influenced both usability and perceived contribution scores, previous findings reported by Van Leer and colleagues^{34,41} are mixed. One study showed a significant and moderately strong correlation between app use measured by Fake Phone Calls completed and SUS scores,⁴¹ while another study found no significant correlation between usage duration of an iOS app for vocal practice and SUS scores.³⁴ In our study, no meaningful correlations were observed between age, Voice Handicap Index, health literacy, or digital literacy and either usability or perceived impact. These results should therefore be interpreted with caution. Later research with a larger, more diverse sample could provide valuable insights into significant associations between demographic factors (e.g., age, sex, profession), voice complaints (e.g., VHI score), user-related factors (e.g., health literacy, digital literacy), and usage time. These findings would enhance our understanding of how these variables influence both the usability and perceived usefulness of *Vocal'iz*.

It should be kept in mind that the DLS used in this study was developed by the authors, as the published DLS⁶⁴ was not available at the time the study protocol was designed and submitted to the ethics committee. Furthermore, there is currently no validated French version of the DLS. One limitation of using an informally developed scale is the absence of normative data. Future studies would therefore benefit from using a validated Digital Literacy Scale, such as the one developed by Avinç and Doğan.⁶⁴

Finally, another limitation of the current use of *Vocal'iz* is the absence of professional supervision, meaning that users may not be performing the exercises correctly or consistently. Unsupervised use of the app could inadvertently lead to vocal strain or misuse, particularly if the exercises are not monitored by a specialist to ensure proper posture, technique, and effort

exertion. In addition, like other applications, *Vocal'iz* relies heavily on another user-related factor: self-motivation. Self-motivation is essential to follow the prescribed exercises, and can affect the app's overall usefulness.

2. Conclusions

Based on scientifically validated questionnaires for the evaluation of mHealth applications, *Vocal'iz* was correctly perceived by a specific group of users at risk of voice disorders: 30 teachers from various education levels. The mobile application shows good usability and is perceived as useful for vocal knowledge. No significant associations were found between usability or perceived usefulness and individual factors such as age, vocal complaints, health literacy, or digital literacy, although teachers with vocal concerns tended to rate the app more favourably. The next step is to evaluate the application's effectiveness in preventing voice problems in teachers and other populations, using both objective and subjective measures. Such a phase would allow a more direct evaluation of the app's contribution to voice disorder prevention and could include comparisons with other approaches or voice applications.

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4. Disclosure statement

No potential conflict of interest was reported by the authors.

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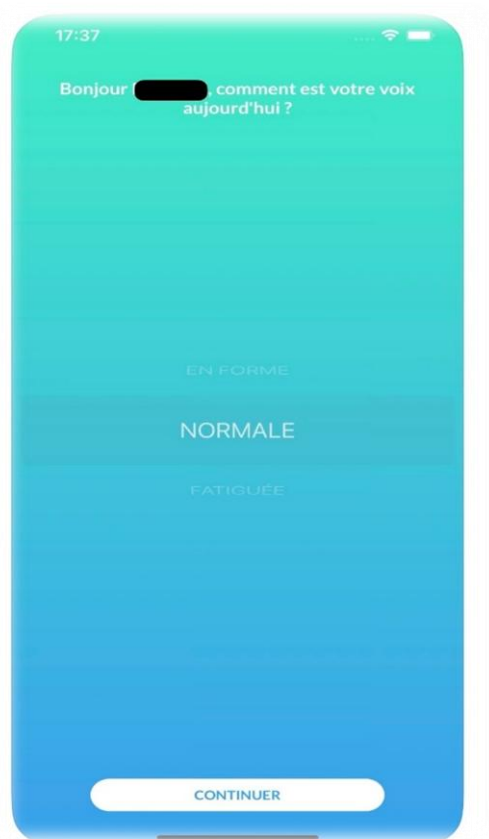
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Appendix A. Screenshots of *Vocal'iz* features

Self-assessment of daily vocal condition



Vocal identity card

 Questionnaire

2 / 10

Éprouvez-vous ou ressentez-vous souvent de la fatigue vocale ?

☐ Oui

☐ Non

SUIVANT

 Questionnaire

3 / 10

Avez-vous du mal à vous faire entendre en milieu bruyant ?

☒ Oui

☐ Non

SUIVANT

 Analyse vocale (parlé)

Lisez à haute voix le texte ci-dessous tout en maintenant le bouton appuyé:

"La nuit s'effaçait, les étoiles pâlissaient, c'était l'heure fraîche qui précède le jour. La lune descendue allait s'enfoncer dans la mer qu'elle nacrail sur toute sa surface."



 Analyse vocale (chanté)

Maintenant vous allez réaliser un exercice appelé la sirène, c'est-à-dire, balayez l'étendue de votre voix en partant d'une note normale jusqu'à la note la plus aigüe que vous pouvez faire. Nous vous conseillons d'écouter le modèle avant de vous lancer !

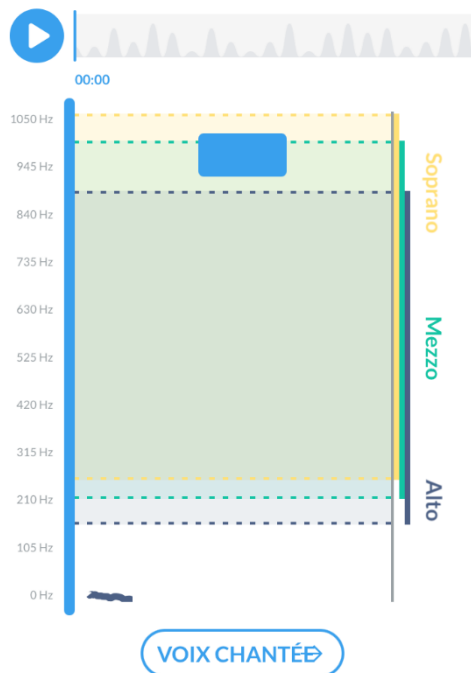

00:00





Voix parlée

Ecoutez votre enregistrement pour découvrir votre fréquence fondamentale.



Analyses

Analyse vocale

Grâce à cette analyse, vous serez en mesure de mieux

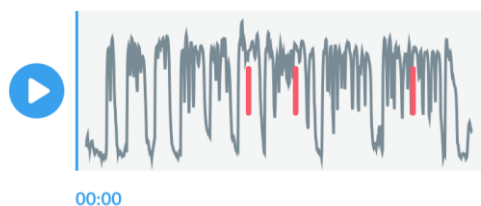
- Analyse des pauses**
Comprenez le rôle des pauses dans le discours (récurrence et durée)
- Débit de parole**
Découvrez votre débit de parole (nombre de syllabes par minutes)
- Fréquence**
Estimez la fréquence de votre voix (Hz)
- Intensité**
Identifiez l'intensité moyenne de votre voix en décibels (dB)

Accueil Exercices Analyse Articles Profil



Analyse des pauses

Ecoutez votre enregistrement pour découvrir votre analyse des pauses.



Hésitation

Durée des pauses

Minimum	Moyenne	Maximum
168 ms	404 ms	600 ms

Fréquence des pauses

14 / min

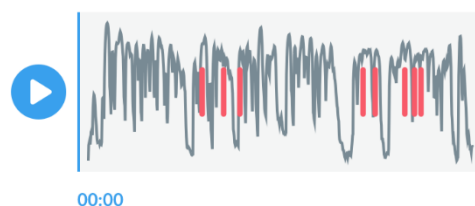
[EXPLICATIONS DE L'ORTOPHONISTE](#)

RECOMMENCER



Débit de parole

Ecoutez votre enregistrement pour découvrir votre débit de parole.



Hésitation

Syllabes

205 / min

Hésitations

8

[EXPLICATIONS DE L'ORTOPHONISTE](#)

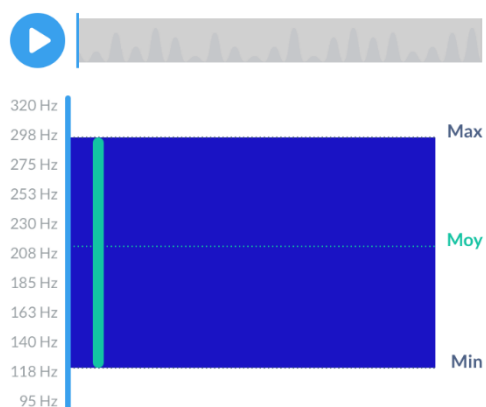
RECOMMENCER

TERMINER



Fréquence

Ecoutez votre enregistrement pour découvrir votre fréquence.



Répétez l'exercice pour comparer les valeurs

Fréquence du dernier enregistrement

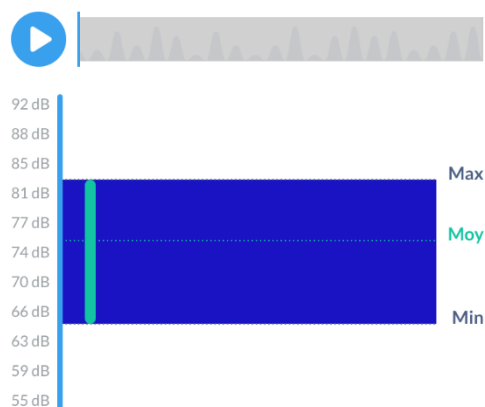
Minimum	Moyenne	Maximum
125 Hz	212 Hz	290 Hz

[EXPLICATIONS DE L'ORTOPHONISTE](#)



Intensité

Ecoutez votre enregistrement pour découvrir votre intensité vocale.



Répétez l'exercice pour comparer les valeurs

Intensité du dernier enregistrement

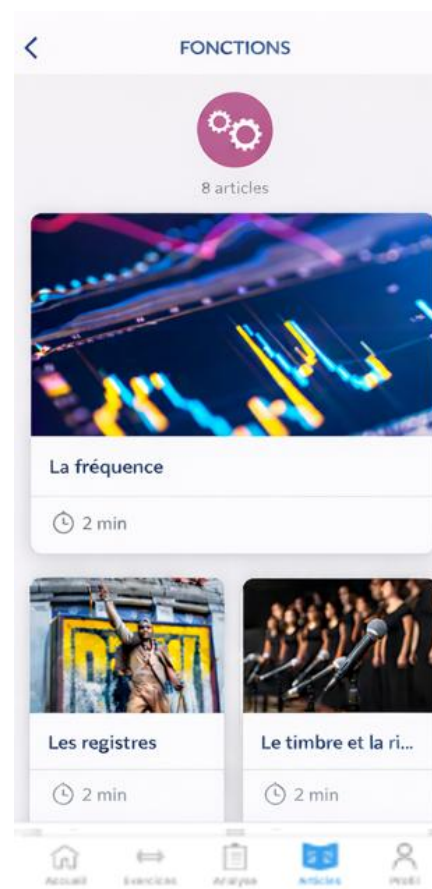
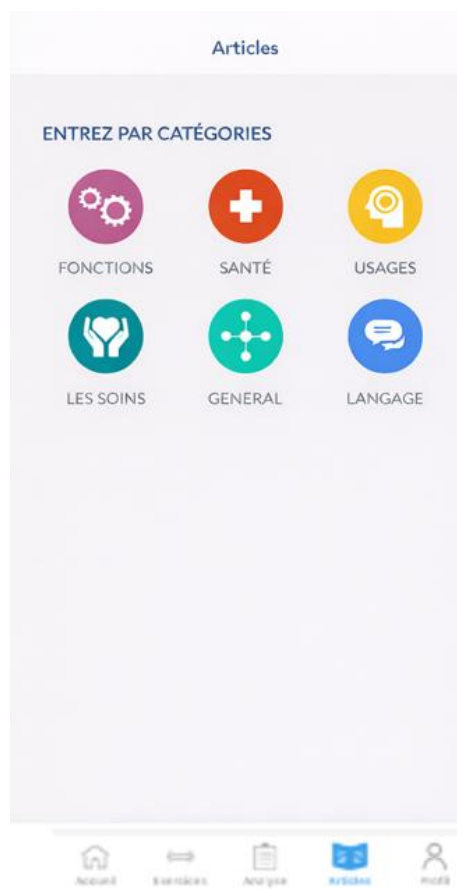
Minimum	Moyenne	Maximum
65 dB	75 dB	82 dB

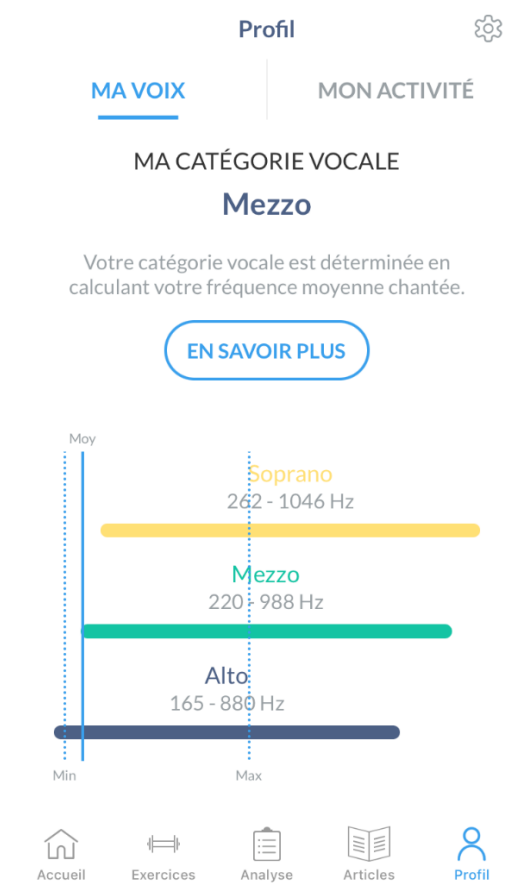
[EXPLICATIONS DE L'ORTOPHONISTE](#)

Exercices



Articles





Appendix B

Digital Literacy Scale items

1. How comfortable do you feel using new technologies (smartphones, tablets, PCs, etc.)?

0 = Slightly comfortable

1 = Moderately comfortable

2 = Very comfortable

3 = Extremely comfortable

2. How often do you use mobile applications on your smartphone?

0 = Never

1 = At least once a month

2 = At least once per week

3 = Every day

3. How often do you use mobile applications related to your health on your smartphone?

0 = Never

1 = Less than once a month

2 = At least once a month

3 = At least once per week

4 = Every day

Appendix C

System Usability Scale items (Brooke, 1986)

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

French version of the System Usability Scale (Graunier & Baudet, 2021)

1. Je voudrais utiliser ce système fréquemment.
2. Ce système est inutilement complexe.
3. Ce système est facile à utiliser.
4. J'aurais besoin du soutien d'un technicien pour être capable d'utiliser ce système.
5. Les différentes fonctionnalités de ce système sont bien intégrées.
6. Il y a trop d'incohérences dans ce système.
7. La plupart des gens apprendront à utiliser ce système très rapidement.
8. Ce système est très lourd à utiliser.
9. Je me suis senti·e très en confiance en utilisant ce système.
10. J'ai eu besoin d'apprendre beaucoup de choses avant de pouvoir utiliser ce système.