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Article

Evaluating the Inclusion of Vocal Training in Spain's Teacher Education: A Quantitative Analysis

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Abstract: The curricula of bachelor's and master's degrees in education should provide optimal tools for teaching practice. An analysis of these curricula in Spanish universities reveals a lack of vocal training. The aim of the present study is to determine whether vocal training in these courses leads to greater knowledge of vocal patterns and techniques, which could lead to greater satisfaction and a lower tendency to abandon the profession. A descriptive–comparative and predictive quantitative study was carried out using an ex post facto, non-experimental, cross-sectional design. The sample consisted of 519 pre-school, primary, and secondary school teachers from all over Spain. The results have confirmed that there is a correlation between having received initial training in vocal hygiene and singing and a tendency to take additional courses in these areas. Furthermore, there is evidence that women and teachers with vocal disorders of the type studied are more aware of voice care in their profession. Finally, a lack of correlation was observed between the training received and the degree of knowledge about vocal health and hygiene. This suggests that both the quantity and quality of training in this area should be increased.

Keywords: teacher training; voice; vocal training; teacher motivation; retention of in-service teachers; vocal hygiene; vocal health

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1. Introduction

Teacher training is one of the fundamental pillars for ensuring quality education in the school system. Teachers are not only transmitters of knowledge but also facilitators of learning and role models for students. Therefore, the quality of the training they receive during their university education has a direct impact on their ability to perform their duties effectively and on their motivation to remain in the profession.

In this context, the voice is an essential tool in teaching practice. The voice is an indispensable working instrument, representing the main channel for the transmission of knowledge, contributing to the education of future generations [1]. Teachers' abilities to express ideas, communicate effectively, inspire students, direct learning, and maintain order in the classroom depend largely on proper training in the use and care of their voice [2,3] and knowledge of sound projection techniques and correct articulation to ensure that the message reaches the students clearly. However, this essential tool has vulnerabilities that represent a significant challenge for educators. Pioneering research in this field, such as studies by García [4] and Gañet et al. [5], has been complemented by more recent studies, such as those from El-Dalatony et al. [6] and Domínguez-Alonso et al. [7], which highlight the prevalence of vocal problems among teachers. For example, speaking in noisy environments, often the case in classrooms, has been shown to lead to an increase in voice intensity, pitch, and phonation time. This demanding vocal behaviour can, among other things, lead to vocal fatigue or loss of correct diction [8]. This makes it essential to not only care for and preserve the voice but also provide adequate vocal training and even training

of the muscles involved in speech during university courses to ensure both educational success and teachers' well-being.

Singing not only enriches the educational environment but also acts as a key methodological tool, especially in the early years of education [9]. Using singing in the classroom can improve memorisation, inclusion, emotional well-being, the acquisition of basic concepts, and social cohesion, as well as reduce stress and foster a positive learning environment, and therefore it should be included in different subjects at school [10–13]. But for all these benefits to be achieved, teachers must have vocal training that allows them to sing correctly, project without tiring their voice, and they should know how to teach their students to sing properly.

However, vocal training does not usually receive the attention it needs in teacher training programmes in Spain [2,14], despite its importance [15]. This raises the need to see how vocal training is addressed in these programmes and to analyse whether the training received in these courses leads to greater knowledge about vocal patterns and techniques and whether it has an impact on teaching practice.

1.1. Vocal Training in Teacher Education

It is essential to include vocal training in the curricula of early childhood and primary education degrees, as well as in master's degrees for secondary education teachers, to ensure the effectiveness and sustainability of teaching practice. Researchers such as Richter et al. [16] and Nusseck et al. [17] have shown that adequate vocal training not only improves teaching quality but also significantly contributes to teachers' vocal health, reducing the incidence of problems such as dysphonia and aphonia. Furthermore, Javier Centeno's doctoral thesis [18] examined the reality that, due to a lack of knowledge, a significant percentage of teachers do not make optimal use of their vocal resources, leading to unsuccessful and potentially harmful vocal efforts. This is why Bele [1] called for the reintroduction of vocal training in infant and primary education degree syllabuses. It also needs to be included in master's degrees in secondary education teacher training [19]. Vocal training provides teachers with essential tools for voice projection and modulation, which facilitates better classroom management and clearer and more effective communication with students. The effectiveness of comprehensive teacher vocal training, verbal communication, and body language programmes, such as the one by Karajalainen et al. in Sweden [20], shows that implementing them is a basic measure for improving both teachers' well-being and students' educational outcomes.

A review of the syllabuses of infant and primary education degrees in Spain reveals a worrying lack of specific vocal training. Although music subjects are included in these degree courses, training in vocal health is neither present nor given due importance, with some exceptions, such as the University of León, which includes specific content on vocal hygiene in the training of future music teachers. For example, at the University of Valladolid, there are subjects in both early childhood education and primary education degrees that deal with vocal education and musical expression, albeit not exhaustively. The reference to music in these degrees includes a specific subject on instrumental and vocal training, but only one of the ten subjects taught is on the voice. Similarly, at the Complutense University in Madrid, early childhood education and primary education degree courses offer subjects with content on spoken and sung voice, but the part referring to music only devotes a small part of its content to vocal technique. The situation is somewhat better at the Autonomous University of Barcelona, where the bachelor's degrees in early childhood education and primary education include some content on vocal performance and song, while the music degree offers a more complete subject on singing and sound projection.

In the case of master's degrees in teacher training for secondary education, which prepare future secondary school and baccalaureate teachers, vocal training is notably absent. Courses at the University of Valladolid include no subjects related to vocal training, even in the specific module for the music speciality. At the Complutense University in Madrid, although the master's degree includes a subject dealing with the voice in adolescence, vocal

training in general is insufficient. The Autonomous University of Barcelona represents a step forward in this respect, as its master's degree includes a significant block on vocal health training for teachers and knowledge of the voice in adolescents, although only offered to those specialising in music.

1.2. Risk Factors for Teachers' Vocal Well-Being

The impact of vocal health on teaching quality cannot be underestimated, as teachers and lecturers suffering from vocal problems may find it difficult to communicate, maintain students' attention, or manage the classroom efficiently. Pathologies such as dysphonia (voice alteration) and aphonia (loss of voice) are common among teachers and can lead to absence from work, poorer-quality teaching, and in severe cases, leaving the profession. Hence, a thorough understanding of both the intrinsic and extrinsic risk factors that impact teachers' vocal well-being is essential [21].

Intrinsic factors include personal characteristics and conditions that may predispose teachers to vocal problems. Genetics plays a significant role, as they can influence the strength and health of the vocal cords. In addition, gender is an important factor, as women tend to have a higher incidence of vocal problems due to anatomical differences in their vocal folds [22]. Age is also relevant, as the voice undergoes changes over time, and older teachers may experience more vocal difficulties [23]. General health status should also be taken into account, as the occurrence of chronic diseases such as asthma, allergies, gastro-oesophageal reflux, and diabetes can negatively affect the voice [24]. Hormonal imbalances, especially in women during menstruation or menopause, can have a significant impact on vocal health. Stress is another important intrinsic factor as it can cause tension in the muscles of the neck and larynx, which negatively affects the voice [25,26]. In addition, individual speech habits, such as speaking too fast or at an inappropriate pitch, can increase the risk of vocal problems [27]. However, research on this point has produced mixed results. Byeon [24] conducted a meta-analysis which confirmed that gender, speaking loudly, and respiratory diseases are risk factors, but no significant association between vocal problems and age, for example, was found.

Extrinsic factors include environmental and working conditions that directly influence teachers' vocal health. Adverse environmental conditions, such as high noise levels in the school environment, force teachers to speak louder, which can lead to excessive and harmful voice use [7]. Air quality in classrooms, affected by dry air, dust, and allergens, can irritate the vocal cords and contribute to vocal problems [28]. In addition, poor classroom acoustics is another critical factor. An environment with poor acoustics requires teachers to raise their voices to be heard, increasing the risk of vocal fatigue, which is why Cantor-Cutiva et al. [29] stressed the importance of adapting classrooms to improve acoustic conditions. In addition, vocal load, i.e., speaking for many hours without adequate rest, is a significant concern. Large classrooms with many students force teachers to project their voice more than necessary, which can result in excessive vocal strain. Similarly, caffeine and alcohol consumption can dehydrate the vocal folds, while smoking significantly irritates and damages them [30]. This study showed that vocal hygiene education significantly improved hydration habits, reduced caffeine and alcohol consumption, and promoted healthier responses to symptoms of throat irritation or vocal fatigue.

This suggests that one key extrinsic factor is a lack of vocal training. Lack of knowledge of proper techniques for continued voice use and lack of vocal hygiene education are important vocal risk factors in teachers [31]. Centeno [18] highlighted the need for specific training in vocal education for the teaching population, indicating that such training can improve voice quality, reduce vocal fatigue, and facilitate the clearer, more reliable transmission of information. Ohlsson et al. [32] confirmed these findings, emphasising the importance of accessible, continuous vocal training for all teaching professionals.

1.3. Teacher Motivation and Retention

Teachers' motivations and their decisions to stay in the profession are influenced by a number of factors, including the quality of teacher training received. This has been identified as a key element in improving job satisfaction and reducing intentions to leave, which in turn improves teacher performance, as confirmed by Tehseen and Hadi [33]. Teachers who feel that they have received comprehensive, adequate training are more prepared to face the challenges of teaching and are therefore more likely to remain in the profession [34]. In this sense, specific vocal training can be an important motivating factor as it provides teachers with the tools they need to use their voices effectively and sustainably. Studies such as Roy et al. [35] have confirmed that problems with teachers' voices affect their job performance, lead to sick leave, and even make them prone to changing jobs. Along similar lines, Melo et al. [36] noted that vocal disability is associated with teachers' job dissatisfaction. Moreover, one of the most recent studies, the National Survey on Teachers' Voices, by the Spanish Society of Otorhinolaryngology and Head and Neck Surgery [37], provided revealing results on the frequency of dysphonia among teachers and its impact on absenteeism, highlighting that 81.79% of participating teachers had suffered from dysphonia at some time and that 29% of respondents had been on sick leave at some point due to voice problems.

Consequently, the general aim of this study is to determine whether vocal training in teachers' bachelor's and master's degree studies leads to greater knowledge of vocal techniques and guidelines and therefore to greater satisfaction and a lower likelihood of leaving the profession.

2. Materials and Methods

A descriptive–comparative and predictive quantitative study was carried out with an ex post facto, non-experimental, cross-sectional design. The survey technique was used. The characteristics of the sample, the variables selected, and the data analysis techniques are detailed below.

The population for the present study was pre-school, primary, and secondary school teachers from all over Spain. Snowball sampling was used from an initial sub-sample of 64 subjects. The final working sample consisted of 519 teachers. In terms of gender distribution, 77% were female and the remaining 23% were male. The mean age of the respondents was 45 years old with a standard deviation of 11.6, suggesting a low dispersion in relation to age (coefficient of variation = 0.25).

The main dependent variable for this study was the level of knowledge about vocal health and hygiene. This was measured using the QSHV scale (the Portuguese acronym for the Questionnaire on Vocal Health and Hygiene) [38]. The questionnaire was translated into Spanish and, to ensure the accuracy of the translation, a Portuguese academic who was bilingual in Spanish and Portuguese reviewed and confirmed that the Spanish version maintained the fidelity of the original content. This scale consists of 31 items that address aspects related to voice, speech, and various situations related to the use and care of the vocal apparatus. Respondents are asked to rate each item in relation to vocal health as either positive, negative, or neutral (see Appendix A). The final score is obtained by awarding one point for each correct answer. The items with positive responses make up 36% of the total (It2, It3, It10, It12, It13, It14, It16, It17, It18, It24, It29); neutral items make up 6% of the total (It7, It20); and negative items represent 58% of the total (It1, It4, It5, It6, It8, It9, It11, It15, It19, It21, It22, It23, It25, It26, It27, It28, It30, It31). The maximum score is therefore 31 points.

Cronbach's α coefficient was used to analyse the internal consistency of the scale. A value of 0.847 was obtained, which, although slightly lower than that reported by [38] in the original Brazilian sample, is considered acceptable.

Along with demographic questions, the questionnaire included questions on the variables related to training: university training in vocal hygiene and singing, completion of courses on vocal hygiene and singing, and the level of education the respondent teaches

at. This variable was coded as a multiple response as some teachers may teach at more than one level. Finally, health status related to voice disorders was considered by including a question on whether the respondent had suffered from any episodes of aphonia or dysphonia.

Table 1 presents the different variables and the sample distribution of subjects in each of the categories.

Table 1. Sample profile.

Description	Variable	Categories	Percentage/Average
QSHV	QSHV		Mean = 26.5 (Max = 31)
University training in vocal hygiene	FUNIHV	0. No 1. Yes	77% 23%
University training in singing	FUNIC	0. No 1. Yes	71% 29%
Courses on vocal hygiene	CURHV	0. No 1. Yes	58% 42%
Courses on singing	CURCAN	0. No 1. Yes	63% 37%
Pre-primary level	NIV_INF	0. No 1. Yes	75% 25%
Primary level	NIV_PRI	0. No 1. Yes	55% 45%
Secondary level	NIV_SEC	0. No 1. Yes	52% 48%
Episodes of dysphonia–aphonia	DIS_AFO	0. No 1. Yes	12% 88%

Source: Authors' own work.

In terms of data analysis, firstly, contingency analyses were carried out to describe the strength and significance of the association between the categorical variables linked to training. In these analyses, the χ^2 statistic was used to assess statistical significance, with values of $\alpha < 0.05$ being considered significant. Effect size was estimated using the Phi coefficient. To improve accuracy in interpreting the results, corrected standardised residual values were included, allowing for verification of statistical significance (values greater than $\pm$ 1.96) between the expected and observed frequency in each cell of the contingency table [39].

Secondly, in order to describe the extent to which training-related variables predicted a higher level of knowledge of vocal health and hygiene, a binary logistic regression model was specified. This technique allows us to predict whether a subject belongs to a certain category on the basis of the behaviour of a series of variables considered to be predictors. Given that the dependent variable must be dichotomous, a new variable was created from the QSHV scale scores, using the median as the cut-off value. The categories considered were as follows: 0. values less than or equal to 27 (median value); 1. values greater than 27.

The following equation was used:

$$Logit[p(Y=1)] = Ln\left[\frac{p_i}{1-p_i}\right] = \beta_0 + \beta_1\, x_1 + \ldots + \beta_n x_n + e_i$$

where

β, each of the coefficients associated with the predictor variables;

p_i, the probability of obtaining a value (1) greater than 27;

$1 - p_i$, the non-occurrence of this phenomenon.

The parameter βx is interpreted as the change in the Logit that results from a unit increase in xp. The odds ratio is defined as the ratio of the probability that the event under analysis will occur to the probability that it will not occur.

Three models were specified. The first considered the demographic variables age and sex, along with variables related to university education and the completion of courses on vocal hygiene and singing (FUNIHV, FUNIC, CURHV, CURCAN). The second model added the variable relating to voice disorders (DIS_AFO). Finally, the third model included the variables related to the education level the respondent teaches at (NIV_INF, NIV_PRI, NIV_SEC).

All analyses were conducted using the SPSS v26 statistical package.

3. Results

First, Table 2 describes the percentages of success on the different items of the QSHV scale.

Table 2. QSHV scale. Percentage of correct answers.

Item	Percentage
It1	92.5%
It2	84.4%
It3	95.4%
It4	95.4%
It5	87.3%
It6	96.9%
It7	80.9%
It8	73.6%
It9	93.8%
It10	90.8%
It11	86.1%
It12	90%
It13	47.2%
It14	90.8%
It15	81.1%
It16	84.4%
It17	94.4%
It18	86.9%
It19	69.2%
It20	78.8%
It21	64.4%
It22	86.1%
It23	80.9%
It24	95.2%
It25	93.4%
It26	89.8%
It27	94.8%
It28	90%
It29	87.1%
It30	89.2%
It31	82.9%

Mean = 26.5; standard deviation = 4.4.

In most cases, the percentage of correct answers was over 80%, with an average scale value of 26.6 out of a maximum of 31, indicating that respondents had a high average level of knowledge about vocal health and hygiene.

Table 3 shows the association between the variables related to training in vocal hygiene and singing received at university and having taken training courses in both subjects. There was a statistically significant association for both vocal hygiene training (χ^2 = 15.306, p = 0.000, Phi = 0.172) and singing training (χ^2 = 87.308, p < 0.000, Phi = 0.410). The effect size was larger in the case of singing training.

Table 3. Completion of courses according to university education received.

Vocal Hygiene			Singing		
CURHV	FUNIHV		CURCAN	FUNIC	
	No	Yes		No	Yes
No	62.2% (1.2)	41.9% (−2.2)	No	75.7% (3.1)	32.2 (−4.8)
Yes	37.8% (−1.4)	58.1% (2.6)	Yes	24.3% (−4)	67.8% (6.2)
$\chi^2 = 15.306$, $p < 0.001$, Phi = 0.172			$\chi^2 = 87.308$, $p < 0.000$; Phi = 0.410		

Note: Percentage values and corrected standardised residuals in brackets are presented for each cell. Source: Authors' own work.

This means that more than 58% of the respondents who had received training in vocal hygiene during their university studies had also taken courses in this area, compared to 41.9% of respondents who received training during their university studies and not taken courses. Furthermore, 62% of those who did not have this training at university had not taken courses either.

The pattern was similar for training in singing, with even more striking differences, as shown by an analysis of the standardised residuals. Nearly 68% of those who had university training in singing also took courses in this field. Just under one in three respondents who received this university training (32.2%) had not taken courses.

Table 4 breaks down this association by educational level. The relationship is, once again, significant at the three levels described. In pre-primary teachers, and in the case of training in vocal hygiene ($\chi^2 = 7.079$, $p = 0.008$, Phi = 0.234), almost 57% of those who studied this subject at university had also taken courses in it. The relationship was more consistent in the case of singing training ($\chi^2 = 25.038$, $p < 0.000$, Phi = 0.441), as indicated by the analysis of the standardised residuals. The percentage reading shows that almost two-thirds of the respondents who received singing training at university, 65.3%, had also taken courses on singing. The effect was larger in the latter case.

There was a similar pattern in the responses from primary school teachers. In the case of training in vocal hygiene ($\chi^2 = 5.614$, $p = 0.008$, Phi = 0.155), 59.2% of teachers who had this training included in their university courses had also taken courses on vocal hygiene. As with pre-primary teachers, the association was even stronger for singing training, as reflected in the values of the standardised residuals and the larger effect size ($\chi^2 = 38.339$, $p < 0.000$, Phi = 0.405). In this case, the percentage of subjects who, having received university training in singing, had also taken courses in it increased to 68.1%.

Finally, looking at the association between these variables for secondary school teachers, the response pattern was very similar, with statistically significant associations in both cases. Considering vocal hygiene training ($\chi^2 = 6.851$, $p = 0.009$, Phi = 0.166), the data show that 57.4% of secondary school teachers who received training in this subject at university had also chosen to take complementary courses. Similarly to the previous education levels, the strength of the association was stronger for singing training ($\chi^2 = 57.203$, $p < 0.000$, Phi = 0.479). Seventy-eight per cent of secondary school teachers who had singing training as part of their university curriculum had also received in-service training. Only 22% of these teachers had not taken any singing training courses.

In order to identify whether training-related variables significantly predicted knowledge of vocal health and hygiene, three logistic regression models were specified to describe the direct and indirect effects of the variables included in the model on the dependent variable (level of knowledge of vocal health and hygiene) (See Table 5).

Table 4. Completion of non-university courses according to educational level of teaching degree.

PRE-PRIMARY					
Vocal Hygiene			Singing		
CURHV	FUNIHV		CURCAN	FUNIC	
	No	Yes		No	Yes
No	68.5% (0.9)	43.2% (−1.4)	No	78.8% (1.9)	34.7% (−2.4)
Yes	31.5% (−1.1)	56.8% (1.8)	Yes	21.3% (−2.4)	65.3% (3.1)
χ^2 = 7.079, p = 0.008, Phi = 0.234			χ^2 = 25.038, p < 0.000, Phi = 0.441		
PRIMARY					
Vocal Hygiene			Singing		
CURHV	FUNIHV		CURCAN	FUNIC	
	No	Yes		No	Yes
No	57.7% (0.9)	40.8% (−1.4)		72.9% (2.6)	31.9% (−3.2)
Yes	42.3% (−0.9)	59.2% (1.4)		27.1% (−2.9)	68.1% (3.6)
χ^2 = 5.614, p = 0.018, Phi = 0.155			χ^2 = 38.339, p < 0.000, Phi = 0.405		
SECONDARY					
Vocal Hygiene			Singing		
CURHV	FUNIHV		CURCAN	FUNIC	
	No	Yes		No	Yes
No	63.4% (0.7)	42.6% (−1.5)		76.3% (2.2)	22% (−4)
Yes	36.6% (−0.9)	57.4% (1.8)		23.7% (−2.9)	78% (5.3)
χ^2 = 6.851, p = 0.009, Phi = 0.166			χ^2 = 57.203, p < 0.000, Phi = 0.479		

Note: Percentage values and corrected standardised residuals in brackets are presented for each cell. Source: Authors' own work.

Table 5. Logistic regression. Estimation of effects for level of knowledge about vocal health and hygiene.

	1st Model	**2nd Model**	**3rd Model**
AGE	0.010 (1.010)	0.010 (1.010)	0.012 (1.012)
SEX	−0.615 ** (0.541)	−0.541 ** (0.603)	−0.450 ** (0.638)
FUNIHV	0.269 (1.308)	1.308 (1.330)	0.273 (1.314)
FUNIC	−0.166 (0.847)	0.847 (0.853)	−0.202 (0.817)
CURHV	0.287 (1.332)	1.332 (1.283)	0.242 (1.274)
CURCAN	0.009 (1.009)	1.009 (0.989)	0.002 (1.002)
DIS_AFO		0.645 ** (1.905)	0.607 ** (1.836)
NIV_INF			0.070 (1.072)
NIV_PRI			0.043 (1.043)
NIV_SEC			−0.225 (0.779)
CONST.	−0.310	−0.896	−0.864
% Classification	57.4%	58.6%	58.8%
-2RLL	704.760	699.759	697.371
Adjusted R^2	0.033	0.045	0.051
χ^2 (sig.)	12.874 **	17.875 **	20.263 **

** p < 0.05.

The resulting final model (third model) presented a good fit, improving the predictive capacity of the null model (Pearson's $\chi^2 = 20.263$; $p < 0.05$) and correctly classifying 58.8% of cases. The reduction in deviancy (-2LLL) in the final model reflects an improvement in model fit by incorporating all variables.

The first model included the demographic control variables age and sex along with university education and other courses on vocal hygiene and singing. None of the variables relating to training significantly predicted greater knowledge of vocal health and hygiene. The variable sex did have significant predictive value. Women were almost 46% more likely ($\beta = -0.615$) to demonstrate a higher level of knowledge than men.

The second model added the variable related to health status: having had an episode of aphonia or dysphonia. This variable was a good predictor of the level of knowledge. Subjects who indicated having suffered an episode of aphonia–dysphonia were 90% more likely to demonstrate a higher level of knowledge about vocal health and hygiene ($\beta = 0.645$). Demographic variables maintained the previous relationship. Only gender predicted a higher level of knowledge. In this case, the value of the coefficient was smaller ($\beta = -0.541$), which seems to indicate that, when controlling for health status, sex has a less direct influence on knowledge.

Finally, the third model included the educational level the respondent taught in. Having taught at one level or another was not a predictor, in any case, of higher or lower levels of knowledge about vocal health and hygiene. Only the variables relating to health status and gender were predictive of knowledge. Being a woman continued to be associated with an increased likelihood of having greater knowledge ($\beta = -0.450$), although the reduction in regression coefficients in the three models points to an effect that is, to a certain extent, mediated by the variables related to educational level and health status. Considering all variables (third model), being female was associated with a 64% higher probability of demonstrating a higher level of knowledge.

The health status variable also predicted knowledge ($\beta = 0.607$). Again, considering all variables, having experienced an episode of aphonia–dysphonia was associated with an almost 84% higher probability of demonstrating greater knowledge about vocal health and hygiene.

The table shows the value of the exponent, its statistical significance, and the value of the odds ratio.

4. Discussion

The results show that, although university training in vocal hygiene and singing is limited (only 1 in 4 professionals received this training during their university education), there is a significant correlation between initial training in vocal hygiene and singing and the tendency to take additional courses in these areas. Therefore, there is an interest in complementing formal training through non-formal training. This association, which is maintained at all three educational levels, is stronger in the case of singing. This finding supports previous studies highlighting the importance of a solid training base to encourage further education [1,18]. Initial training acts as a catalyst for continuing education, underlining the need to include specific vocal training modules in university curricula [40,41]. In this regard, the results showed that almost 68% of teachers who received university training in singing also took additional courses. This has positive implications for including this type of training in teachers' curricula, as it raises awareness of the importance of vocal care. This finding is consistent with studies such as Richter et al. [16] and Nusseck et al. [17], highlighting the need to include comprehensive vocal training in teacher education programmes. Lack of adequate training can lead to vocal health problems, which in turn affect teaching quality and teachers' well-being [40,42].

Following this line, it is important to highlight the benefits of adequate vocal training, as it not only improves teaching quality but also teachers' vocal health. Following this line, it would be logical to conclude that receiving adequate vocal training not only improves the quality of the teaching they provide but also the vocal health of teachers. However,

although it may seem paradoxical, our results have shown that training, both formal and informal, does not predict greater knowledge about vocal health and hygiene. In this regard, Richter et al. [16] mention several studies on the effectiveness of voice training programmes for teachers, the results of which are inconclusive. These researchers believe that this is due to the methodological quality of the studies (the samples are very small or the time that elapses between the training and the follow-up study is very short, etc.), and they also refer to the quality of the content taught, the duration of the training sessions, and the number of training sessions. Therefore, considering our results and previous research, we consider that more comprehensive and quality research should be carried out in this area and, in turn, not only the quantity of training in terms of the number of hours and sessions should be increased but also the quality of this training.

Improving vocal training in teacher education programmes would not only benefit educational practice but could also have a positive impact on teacher retention and motivation in the long term, as adequate vocal training could provide teachers with the skills they need to cope with the vocal challenges of teaching and thus reduce the risk of vocal problems that could lead to burnout and discomfort in the workplace [36,43,44]. In this regard, implementing vocal training programmes can be highly beneficial in both initial and in-service training. When properly implemented, these programmes can significantly improve teachers' vocal health and classroom performance. Voice workshops are an effective preventive action to reduce inappropriate behaviours and improve voice use in the natural context of the classroom [16,45,45]. Continuing education in vocal training and singing is essential in order to maintain and improve teachers' vocal skills. The results of the present study showed that those who received initial training in these areas were more likely to seek continuing education, suggesting that a solid foundation in vocal training is crucial for fostering a culture of continuous improvement and vocal self-care. The results obtained provide empirical evidence supporting the need to promote specific, ongoing training for teachers, particularly in areas related to voice use. This approach could positively influence educational policies, facilitating the allocation of key resources for its implementation. For instance, if teacher training faculties acknowledge the implications of adequate training in vocal techniques and voice projection, they could incorporate these topics into academic programmes. This would foster a preventive culture among future teachers, helping them develop essential vocal skills and reducing the risk of voice-related issues in their professional practice. This finding is consistent with the existing scientific literature, which highlights the importance of vocal training in preventing vocal problems and improving teacher well-being [16,17].

When it comes to the educational level teachers work in, the results indicate that it was not a significant predictor of vocal health and hygiene knowledge. This suggests that differences in vocal health knowledge are not related to the educational level teachers teach in but rather to individual factors such as stress, poor sleep [46], or even high noise levels in the classroom [42]. Our results indicate that regardless of the initial training and educational level at which they carry out their professional activity, being a woman and having suffered an episode of aphonia or dysphonia predicts a greater inclination to seek information on vocal health and hygiene (or better access to such information), which could be related to a greater awareness among women and teachers with vocal difficulties of the importance of voice care in their profession [40,42,47].

5. Conclusions

The aim of this study was to find out about teaching training on vocal hygiene and singing received in master's and bachelor's degree courses and the relationship of this training with the degree of knowledge of vocal patterns and techniques.

Firstly, it has been observed that, despite the limited training in vocal hygiene and singing provided to trainee teachers, there is a demonstrated interest in enhancing this knowledge through the pursuit of supplementary courses in these fields. This underscores that a solid foundation in these skills is essential to foster continuing education and vocal

self-care among teachers. Secondly, there was a lack of correlation between having received training, both formal and non-formal, and the degree of knowledge about vocal health and hygiene. This result points to the fact that both the quantity and quality of training received in this area should be increased. Improving vocal training in teacher education programmes would not only benefit educational practice but could also have a positive impact on teacher motivation in the long term. Adequate vocal training provides teachers with the necessary skills to meet the vocal challenges of teaching and reduce the risk of vocal problems that can lead to burnout and job dissatisfaction. Neglecting this aspect may lead to cumulative challenges that impact the sustainability of the profession and teacher retention. Thirdly, it has been observed that being a woman and having suffered an episode of aphonia or dysphonia predict a greater knowledge of vocal health and hygiene, leading to the conclusion that women and teachers with vocal disorders of the type analysed have a greater awareness of voice care in their profession.

In conclusion, it is very important to emphasise that teacher education programmes in Spain should integrate vocal training more fully and effectively. This would not only improve the quality of teaching and the vocal health of teachers but also contribute to greater teacher motivation in the profession. In this sense, we recommend the inclusion of content related to the vocal health of teachers in the music courses of the pre-primary and primary education degrees and in the master's degree for secondary school teachers. In addition, it would be appropriate to hold teacher's vocal hygiene literacy workshops as part of their continuing education. On the other hand, we propose that the annual medical examination of teachers should include a test for the detection of symptoms related to vocal pathologies. These and other proposals for action could be developed in a future study that would give continuity to the current one.

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Informed Consent Statement: Not applicable.

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Appendix A. QSHV Scale

Item	Statement
It1	Being in a dusty environment
It2	Have a relaxed neck region
It3	Speak without effort
It4	Shout out
It5	Inappropriate singing
It6	Perform vocal abuses
It7	Drinking or eating aloe vera
It8	Inadequate vocal preparation
It9	Vocal fatigue
It10	Doing vocal exercises
It11	Failure to coordinate speech with breathing
It12	Vocal technique exercises
It13	Using a microphone to teach
It14	Getting a good night's sleep
It15	Speaking without pauses
It16	Perform voice therapy (vocal rehabilitation)
It17	Talking comfortably
It18	Vocal warm-up
It19	Using anabolic agents (steroid hormones)
It20	Chewing balsam leaf (plant)
It21	Talking during physical exercise
It22	Having allergies
It23	Singing with a cold
It24	Healthy vocal habits
It25	Do not consume fluids during the day
It26	Holding your nose
It27	Talking in a noisy environment
It28	Being in a mouldy environment
It29	Performing diction (speech articulation) exercises
It30	Having sinusitis
It31	Improper body posture

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