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Table of contents

Project Proposal

Context	3
Justification	
Intended Impact.....	4
Outlined Intention.....	5
Ethics and Insider Research	
Individual Learning Outcomes.....	6

Project Report

Introduction	
Literature Review.....	8
Methodology.....	13
Research Methods.....	15
Findings and Discussion.....	18
Appendix.....	34
Reference List.....	42

Project Proposal

Project Title: How do teachers with vocal fatigue experience the implementation of a combined singing-pedagogy and voice-therapy routine, and what changes do they report in vocal ease, endurance, and day-to-day workload tolerance?

Context

Numerous studies show the need for a strategy to reduce vocal fatigue experienced by primary music teachers (Connor and Morrow, 2011; Schmidt and Morrow, 2016; Brunkan, 2018; Baker and Cohen, 2017; Banks, Cantor-Cutiva and Hunter, 2022). I will investigate whether music teachers in primary school environments who work in both group and one-on-one settings can achieve a balance in vocal health by applying both singing-pedagogy and voice-therapy principles.

The study is situated within primary and elementary school environments across the United Kingdom, the United States, and the Slovak Republic, where music teaching participants and singing instructors perform classroom teaching and individual lessons. They depend on sustained spoken and sung unamplified voice use with a limited recovery time. Their tasks include instructional speech, singing demonstration, projection over noise, and classroom management, often across consecutive sessions in acoustically changeable spaces, along with contributing factors such as occupational stress (Vilkman, 2004).

Past research by Hunter et al. (2011), Roy et al. (2004), and Titze et al. (2010) confirms that music teachers experience particularly high vocal demands, 20-50% of teachers experience voice problems during their careers, and have been identified for a longer period of time as an occupational group at increased risk of voice disorders.

Intervention has developed within two separate domains: clinical voice therapy, focusing on structured therapeutic exercises (Stemple, Angadi and Croake, 2019), and singing pedagogy, emphasising efficient breath and resonance coordination (Miller, 1996). While preventative strategies are increasingly discussed, many teacher-focused recommendations continue to prioritise vocal hygiene instead of structured training approaches. Due to the specificity of the occupational group's vocal demands, my intention will be to test the simultaneous application of both approaches and strive for routine development.

Justification

Teachers' vocal demands are continuous and a part of their daily professional responsibilities (Sataloff, 1997; Boone et al., 2019). Therefore, any intervention must be compatible with their schedule, workload, and expectations. As a voice professional, I struggled to maintain the right balance between recovery and training of my vocal instrument. Constant steering between vocal

demands and recovery phases, together with structured voice training to prepare for everyday professional vocal load, requires discipline in the form of a routine (Thorpe et al., 2001).

Historically, voice care has not been systematically integrated into teacher education or professional development (WHO, 2001; ILO, 2012), and voice therapy or singing-based vocal training is rarely positioned as a preventative or rehabilitative tool within institutional frameworks (Stemple et al., 2014). One significant gap is that schools often lack structured support systems for vocal health. Although sick leave due to voice problems may occur, preventative frameworks remain uncommon (ASHA, 2020).

This project responds directly to that gap by implementing a combined singing-pedagogy and voice-therapy routine tailored to teachers with vocal fatigue. By exploring how teachers experience this intervention and what changes they report in vocal ease, endurance, and day-to-day workload tolerance, the study addresses both an occupational health issue and a pedagogical sustainability concern.

Another, more concrete gap is how training programmes can proactively support vocal health through combined, practical strategies rather than isolated exercises. Much of the literature emphasises discrete techniques; only a few studies examine integrated routines embedded within occupational settings (Verdolini Abbott, 2008). There is a lack of evidence regarding the impact of combining a formal programme with the development of a sustainable daily routine tailored to participants' vocal demands.

The chosen methods will allow for the assessment of vocal fatigue before and after the implementation of the combined programme. Structured self-report measures are suitable for tracking participants' perceived changes in vocal effort and endurance, while remaining non-invasive and manageable within an academic setting (Cohen et al., 2018). Ethical procedures, such as including informed consent, voluntary participation, confidentiality, and secure data handling, align with established research governance standards (APA, 2017).

Intended Impact

This project aims to test a structured vocal-fatigue resistance programme that addresses an identified gap in current practice: the limited integration of singing pedagogy and clinical voice therapy within a sustainable routine tailored to teachers' professional workload. Although therapeutic voice exercises and singing-based training have independently demonstrated benefits for vocal function (Stemple, Roy and Klaben, 2014), they are rarely combined into a preventative model designed specifically for occupational voice users such as teachers. Given that teaching is associated with sustained vocal demand and elevated risk of fatigue (Sataloff, 1997), this study intends to evaluate whether embedding a combined approach into a manageable daily or weekly routine can improve perceived vocal ease, endurance, and workload tolerance.

The wider ramifications of this project may extend to professional development and occupational well-being frameworks. If effective, this may encourage the inclusion of preventative voice training within teacher education and continuing professional development contexts. By embedding the practice-based evidence into workload realities, the study may support a shift from reactive voice care toward proactive, sustainable voice management in educational settings.

Outlined Intention

The intervention will be delivered to a small cohort of teachers (approximately 4 - 9 participants) who experience vocal fatigue in their professional practice. The programme will be implemented between February and October 2026. Data collection will take place primarily online (surveys, journals, interviews), allowing participation of teachers from the UK, the US, and Slovakia. The programme will be introduced via guided online sessions and supported by recorded demonstrations along with written instructions. Participants will integrate the routine into their weekly teaching schedule over a defined training period (approximately 6 - 8 weeks).

The study will use a mixed-methods approach to capture both lived experience and measurable change. Because vocal fatigue is both a physiological and perceptual phenomenon, combining quantitative and qualitative methods allows for a better understanding of its management.

Participants will complete a baseline survey before the intervention and a post-programme survey after completion. These will include validated or adapted measures assessing vocal effort, fatigue, workload tolerance, and ease of phonation using Likert scales and numerical ratings. Pre and post-comparison allows for measurable identification of change over time, and the self-report measures are appropriate because vocal fatigue is strongly linked to subjective perception of effort and endurance. Descriptive statistical analysis (mean scores, percentage change) is suitable for the small sample size and practice-based nature of the study (Cohen, Manion and Morrison, 2018). At the end of the programme, participants might take part in a 20 - 30 minute semi-structured interview, which will explore perceived changes and challenges in routine implementation. Data will be coded using thematic analysis to identify recurring patterns relating to vocal ease, fatigue resistance, and sustainability of practice.

Participants will complete brief weekly reflections during the intervention period, commenting on vocal comfort, fatigue levels, and ease of completing the exercises.

Ethics and Insider Research

The research activity will commence after receiving the approved Ethical Form, which defines the use of data and includes adherence to ethical guidance documents. The informed consent outlines

the purpose of the study, the methods of collecting and processing data, the freedom to withdraw, compliance with anonymity, and the interpretation of results (University of Wales Trinity Saint David, 2022). Clarifying and justifying the role of the researcher is the first step towards ensuring the credibility of the work. I will be positioned as an insider researcher. I find the network of teachers in my workplace to be an advantage. However, there is a risk of pre-analysing the interpretations of respondents (DeLyser, 2001). To avoid bias, I will apply analysis as a rigorous method and reflect in, on, and through action (Schön, 1983) using my reflective journal.

Individual Learning Outcomes

- To integrate occupational voice health, singing pedagogy, and voice-therapy evidence into a practical intervention framework.
- To design and implement a combined singing-pedagogy and voice-therapy routine suitable for primary music teachers with vocal fatigue.
- To assess perceived changes in vocal ease, endurance, and workload tolerance using mixed-methods data collection and basic descriptive analysis.
- To develop a reflective insider-research practice (Schön, 1983) to monitor and reduce potential researcher bias during data interpretation.

Project Report

Introduction

Voice use is central to the professional practice of teachers, particularly those working in music education. In contrast to many other professions, teaching requires prolonged and often intensive vocal use throughout the working day. Primary music teachers rely on both speaking and singing voices to deliver instruction, demonstrate musical material, and manage classroom environments. As a result, teachers are widely recognised as an occupational group with the highest risk of experiencing vocal fatigue and voice disorders. Research suggests that between 20% and 50% of teachers experience voice problems during their careers (Roy et al., 2004; Hunter et al., 2011; Titze et al., 2010).

This project is situated within the context of primary and elementary school music education environments across the United Kingdom, the United States, and the Slovak Republic. Teachers' vocal demands often occur across consecutive lessons with limited opportunities for vocal recovery. Environmental factors such as classroom noise, varying acoustics, and large group settings can further increase vocal strain. In addition, occupational stress and workload pressures may contribute to the development and perception of vocal fatigue (Vilkman, 2004), and later voice

disorders. For many teachers, maintaining vocal health becomes a continuous challenge within the realities of daily professional practice.

Historically, guidance for teachers experiencing vocal fatigue has often focused on vocal hygiene strategies such as hydration, vocal rest, and avoiding excessive strain. While these recommendations are valuable, they may not provide sufficient support for individuals whose professions require consistent and intensive voice use. Within existing literature, two areas of practice have been identified as beneficial for improving vocal efficiency and resilience: clinical voice therapy and singing pedagogy. Clinical voice therapy typically involves structured exercises designed to rehabilitate or optimise vocal function (Stemple, Angadi and Croake, 2019), while singing pedagogy emphasises efficient breath management, resonance balance, and healthy vocal production (Miller, 1996). Although both approaches have demonstrated benefits independently, they are rarely integrated into a structured routine specifically designed for occupational voice users such as teachers. As a result, there remains limited research examining how combining these practices may support teachers in managing vocal fatigue within their everyday working environments.

Preventative training or institutional support for vocal health remains relatively uncommon (American Speech-Language-Hearing Association, 2020). This project responds to this issue by exploring whether a combined routine drawing on both singing pedagogy and voice therapy can provide a practical and sustainable strategy for teachers experiencing vocal fatigue.

The primary aim of this study is to investigate how teachers with vocal fatigue experience the implementation of a combined singing-pedagogy and voice-therapy routine. In particular, the research seeks to explore reported changes in vocal ease, endurance, and tolerance of day-to-day vocal workload. A small cohort of teachers will participate in a structured programme delivered through guided online sessions and supported by recorded demonstrations and written instructions. Participants will incorporate the routine into their weekly teaching schedules over a defined training period. The study will adopt a mixed-methods approach to data collection, combining pre- and post-intervention surveys with weekly reflections and optional semi-structured interviews. Quantitative self-report measures will help identify perceived changes in vocal fatigue and effort, while qualitative reflections will provide insight into participants' lived experiences of implementing the routine within their professional environment.

The research aims to contribute to discussions surrounding preventative voice care for occupational voice users. If the intervention proves beneficial, it may support the inclusion of structured vocal health training within teacher education programmes or continuing professional development initiatives. Such developments could encourage a shift from reactive treatment of voice problems toward proactive strategies that promote sustainable vocal use and long-term vocal wellbeing in teaching environments.

As a voice professional conducting insider research within the field of music and voice education, this study also provides an opportunity to integrate knowledge from occupational voice health, singing pedagogy, and voice therapy into a practical intervention framework. Overall, the project seeks to explore how an integrated vocal training routine may support teachers experiencing vocal fatigue while contributing to a broader understanding of sustainable voice use within educational settings.

Literature Review

Occupational Voice Use and Vocal Health

Voice production plays a central role in many professions, yet some occupational groups rely on sustained voice use to a far greater extent than others. Teachers are widely recognised as one of the most at-risk professional groups for voice disorders due to prolonged speaking, frequent voice projection, and limited opportunities for vocal recovery during the working day. Early occupational voice research highlighted that teaching requires continuous vocal load across multiple hours of classroom instruction, often in acoustically challenging environments (Vilkman, 2004). These demands place teachers within the category of professional voice users, whose livelihood depends on maintaining functional vocal capacity.

The prevalence of voice problems among teachers has been extensively documented. A large epidemiological study conducted by Roy et al. (2004) found that teachers report voice disorders significantly more frequently than other occupational groups. Similarly, Titze, Lemke and Montequin (1997) identified teachers as a population experiencing unusually high rates of vocal strain due to environmental noise and extended speaking durations. Subsequent research has reinforced these findings. Hunter, Tanner and Smith (2011) demonstrated that teachers frequently report symptoms including hoarseness, vocal fatigue, and decreased vocal endurance, often developing gradually through cumulative vocal loading during the school week.

While the general teaching profession is widely recognised as vocally demanding, music educators may face particularly intense vocal requirements. In addition to spoken instruction, music teachers frequently demonstrate musical material through singing and must often project their voices above instrumental sound or classroom noise. This dual use of speaking and singing increases both the duration and complexity of vocal tasks within the teaching environment. As Titze et al. (2010) argue, occupational voice users who combine speech and singing demands may experience greater cumulative vocal loading than those relying solely on speech.

Despite growing recognition of the problem, structured vocal health training remains inconsistently implemented within teacher education programmes. Historically, preventative voice care for teachers has focused primarily on advice relating to vocal hygiene, such as maintaining hydration, avoiding excessive throat clearing, and limiting shouting (Mattiske, Oates and Greenwood, 1998). While such recommendations are valuable, critics argue that hygiene-based approaches alone

may be insufficient for individuals whose professions require unavoidable and sustained voice use. As Vilkman (2004) notes, teachers cannot simply reduce their vocal output without compromising the core requirements of their professional roles.

Consequently, increasing attention has been directed towards the development of structured training approaches designed to improve vocal efficiency and resilience in occupational voice users. These approaches include clinical voice therapy exercises, pedagogical voice training, and preventative programmes aimed at reducing vocal fatigue. Understanding the strengths and limitations of these approaches is essential for evaluating how interventions may be adapted to support teachers experiencing vocal fatigue within real working environments.

Vocal Fatigue in Teachers

Vocal fatigue is commonly reported among teachers and represents one of the most frequent early symptoms of developing voice disorders. Unlike acute voice pathologies, vocal fatigue is often characterised by subjective sensations such as increased vocal effort, reduced endurance, or discomfort during prolonged voice use. Hunter and Titze (2009) describe vocal fatigue as a multidimensional phenomenon involving both physiological changes in the vocal folds and perceptual experiences of effort and strain during phonation.

Within educational settings, several environmental and behavioural factors contribute to the development of vocal fatigue. Classroom noise levels often require teachers to increase vocal intensity in order to maintain audibility, leading to elevated phonatory effort over extended periods. In addition, teachers frequently speak continuously with limited opportunities for vocal rest between lessons. These cumulative demands may result in temporary vocal impairment that, if repeated regularly, can contribute to longer-term vocal pathology (Cantor-Cutiva, Bottalico and Hunter, 2022).

Music teachers face additional challenges related to vocal fatigue due to the requirement to alternate between speaking and singing tasks. Singing demonstrations may involve wider pitch ranges, increased respiratory support, and dynamic vocal projection, which can intensify vocal loading when combined with extended spoken instruction. As Hunter et al. (2011) suggest, the complexity of vocal tasks in music education contexts may increase the tendency to fatigue when compared with speech-based teaching alone.

Vocal fatigue is not solely a physiological issue but also a perceptual one. Teachers often report that fatigue manifests as a subjective sense of effort or reduced vocal control, even when objective vocal parameters remain within typical limits. Because of this perceptual dimension, self-report measures have become widely used in research examining vocal fatigue and its management. Instruments such as the Voice Handicap Index (VHI) (Jacobson *et al.*, 1997) and the Voice-Related Quality of Life (V-RQOL) scale (Hogikyan and Sethuraman, 1999) allow researchers to capture the

experiential and psychosocial aspects of vocal difficulties that may not be detectable through acoustic analysis alone.

Recognising the multifaceted nature of vocal fatigue has significant implications for intervention design. Strategies aimed at supporting teachers' vocal health must address not only physiological efficiency but also the practical realities of sustained voice use within occupational settings.

Preventative Strategies: Vocal Hygiene Education

One of the earliest approaches to preventing voice disorders in teachers involved vocal hygiene education programmes. Vocal hygiene typically refers to behavioural recommendations intended to reduce harmful vocal habits and support general vocal health. Common guidelines include adequate hydration, avoidance of excessive throat clearing, reduction of shouting, and awareness of environmental factors such as background noise.

Several studies have evaluated the effectiveness of vocal hygiene interventions among teachers. In a randomised clinical trial, Roy et al. (2001) compared the outcomes of vocal hygiene education with those of structured voice exercises among teachers experiencing voice disorders. Although participants receiving hygiene instruction demonstrated improved knowledge of voice care practices, the intervention produced relatively limited improvements in self-reported vocal symptoms compared with exercise-based therapy programmes. Similarly, Pasa, Oates and Dacakis (2007) investigated the preventative effects of vocal hygiene training in primary school teachers. Participants who received hygiene education reported increased awareness of vocal behaviours and some improvement in vocal symptoms; however, the study also indicated that behavioural advice alone may not sufficiently address the functional demands placed on teachers' voices.

More recent research has continued to highlight limitations associated with hygiene-based interventions. For example, a study examining teachers' responses to vocal hygiene training found that while participants expressed willingness to adopt recommended behaviours, practical constraints such as classroom noise and workload often prevented consistent implementation of these strategies. These findings suggest that vocal hygiene education may be a useful component of voice care programmes but is unlikely to provide a comprehensive solution for teachers experiencing persistent vocal fatigue. As a result, researchers have increasingly explored structured exercise-based interventions aimed at improving vocal efficiency and endurance (Ramos *et al.*, 2025).

Clinical Voice Therapy Interventions

Clinical voice therapy represents one of the most widely researched approaches to improving vocal function in individuals experiencing voice disorders. Voice therapy typically involves structured exercises designed to optimise vocal fold vibration, respiratory coordination, and resonance balance (Angadi, Croake and Stemple, 2019). These interventions are commonly delivered by speech-language pathologists and may include techniques such as Vocal Function Exercises (VFEs), resonant voice therapy, and semi-occluded vocal tract exercises.

Vocal Function Exercises, developed by Stemple and colleagues, are among the most extensively studied therapeutic protocols for improving vocal efficiency. The exercises are designed to strengthen and balance the laryngeal musculature through a series of sustained phonation tasks and pitch glides. In a randomised clinical trial involving teachers with voice disorders, Roy et al. (2001) found that participants who adhered to a VFE programme reported significant improvements in self-perceived voice quality compared with those receiving vocal hygiene instruction alone. Further research has supported the effectiveness of exercise-based voice therapy for teachers. Gillivan-Murphy et al. (2006) examined a six-week intervention combining vocal function exercises with vocal hygiene education. Teachers who participated in the programme reported significant reductions in vocal symptom severity and improved knowledge of voice care strategies, indicating that structured therapeutic exercises may provide measurable benefits for occupational voice users.

Additional studies have evaluated the broader impact of voice training programmes that incorporate therapeutic exercises. For example, studies involving teachers have demonstrated improvements in acoustic voice parameters, perceptual voice quality and self-reported vocal wellbeing following structured programmes combining vocal hygiene education with practical voice-training exercises (Ilomäki *et al.*, 2008; Pizolato *et al.*, 2013). However, evidence regarding the longer-term maintenance of these improvements remains less consistent (Pizolato *et al.*, 2013). Despite these positive outcomes, several limitations have been identified within existing therapy-based research. Many studies involve relatively short intervention periods or clinical settings that differ substantially from teachers' everyday working environments. As a result, the long-term sustainability of these programmes within real teaching contexts remains uncertain. Furthermore, therapy protocols are often designed primarily for rehabilitation rather than preventative voice training, potentially limiting their applicability for teachers seeking to manage vocal fatigue before significant pathology develops.

Singing Pedagogy and Vocal Efficiency

While clinical voice therapy focuses on rehabilitating vocal function, singing pedagogy emphasises efficient vocal production through the coordination of respiration, phonation, resonance, and vocal tract configuration (Herbst, 2017). These principles are widely applied in the training of singers, but related techniques, particularly those involving vocal tract shaping and semi-occluded vocal tract exercises, have also been adopted within voice therapy and training for other professional voice

users (Titze, 2006). Pedagogical approaches to voice training frequently draw upon concepts such as appoggio breathing, resonance optimisation, and balanced phonation, all of which aim to reduce unnecessary muscular tension during voice production. Miller (1996) argues that efficient coordination between respiratory support and vocal fold vibration is fundamental to sustainable vocal performance, particularly in professions requiring extended voice use.

Although singing pedagogy has traditionally focused on artistic performance, several researchers have suggested that pedagogical voice training may offer valuable strategies for teachers seeking to improve vocal efficiency. By developing greater awareness of breath management and resonance, teachers may be able to project their voices more effectively while reducing phonatory effort. However, the application of singing pedagogy within teacher voice research remains relatively limited. Much of the established voice-training and pedagogical literature has traditionally focused on singers and other performance voice professionals, with comparatively less attention given to occupational voice users such as teachers (Hazlett, Duffy and Moorhead, 2011). Consequently, there is comparatively little empirical evidence examining how pedagogical techniques might be adapted for teachers experiencing vocal fatigue within everyday educational environments.

Integrated Voice Training Approaches

Recognising the limitations of single-approach interventions, some researchers have begun exploring programmes that combine multiple strategies for improving vocal health in teachers. Integrated interventions typically incorporate elements of vocal hygiene education, therapeutic exercises, and voice training techniques. Studies examining combined voice training programmes have reported promising results. For example, Ilomäki, Laukkanen and Vilkman (2008) investigated the effects of a voice training programme that included both hygiene education and practical vocal exercises. Teachers participating in the programme demonstrated improvements in acoustic voice measures as well as increased perceptions of vocal wellbeing.

Despite these encouraging findings, integrated programmes remain relatively uncommon within the literature. Existing studies have frequently evaluated specific direct or indirect voice interventions, or compared these approaches, rather than examining how multiple training strategies might operate together within a sustained routine (Anhaia, Gurgel and Vieira, 2013; Gillivan-Murphy *et al.*, 2006). Furthermore, teacher voice interventions have commonly been delivered as relatively short or time-limited programmes, with studies employing formats such as six-week treatment periods, short courses and a limited number of training sessions (Gillivan-Murphy *et al.*, 2006; Bovo *et al.*, 2007; Pizolato *et al.*, 2013). This leaves scope for further investigation into approaches that can be incorporated more consistently into teachers' everyday working routines. This gap suggests a need for research exploring how combined training approaches might be implemented in ways that are both practical and sustainable for teachers managing daily vocal demands.

Research Gap and Study Justification

Although a substantial body of research has examined voice problems among teachers, several gaps remain within the existing literature. First, many studies focus primarily on vocal hygiene education, which may be insufficient for addressing the functional demands of sustained occupational voice use. Second, while clinical voice therapy exercises have demonstrated effectiveness in improving vocal function, these interventions are often delivered within clinical contexts and may not always translate easily into everyday teaching environments. Furthermore, relatively few studies have examined the potential benefits of integrating principles from both singing pedagogy and clinical voice therapy within a single training framework. Existing research tends to treat these approaches as separate domains, despite their shared emphasis on efficient voice production and sustainable vocal technique.

Finally, much of the literature focuses on objective acoustic measurements rather than exploring teachers' subjective experiences of implementing voice training strategies within their professional routines. Given that vocal fatigue is strongly linked to perceptual experiences of effort and endurance, understanding how teachers perceive the impact of training interventions is an important area for further investigation. In response to these gaps, the present study explores the implementation of a combined singing-pedagogy and voice-therapy routine designed specifically for teachers experiencing vocal fatigue. By examining both perceived changes in vocal ease and the practical sustainability of the routine within participants' professional contexts, this research seeks to contribute new insights into preventative voice care strategies for occupational voice users.

Methodology

Research Paradigm

This study adopts an interpretivist research paradigm, supported by pragmatic elements, in order to investigate how teachers experiencing vocal fatigue perceive and report the implementation of a combined singing-pedagogy and voice-therapy routine. The interpretivist paradigm is particularly appropriate for research questions that focus on individuals' experiences, perceptions, and meanings (Cohen, Manion and Morrison, 2018). Because the central research question seeks to understand how teachers experience the implementation of the routine and what changes they report in vocal ease, endurance, and workload tolerance, the study must prioritise participants' subjective perspectives.

From an ontological standpoint, the research is situated within a relativist perspective, which assumes that multiple realities may exist depending on individuals' experiences and contexts (Cohen, Manion and Morrison, 2018). In the case of vocal fatigue, teachers' experiences may differ according to factors such as classroom acoustics, vocal demands, teaching style, and individual

vocal technique (Vilkman, 2004). Therefore, the study does not assume that vocal fatigue or vocal improvement will manifest identically across participants. Instead, it acknowledges that teachers may interpret vocal ease, endurance, and fatigue differently within their own professional environments. Epistemologically, the study adopts a constructivist approach in which knowledge is generated through the interaction between the researcher and participants. Participants' reflections, survey responses, and interviews contribute directly to the understanding of how the intervention functions in practice. Because the research question explicitly asks how teachers experience the routine and what changes they report, participants' subjective accounts are central to knowledge production.

At the same time, the study incorporates pragmatic elements by integrating quantitative self-report measures that allow perceived changes in vocal fatigue, endurance, and vocal effort to be examined across the intervention period. Pragmatism supports the use of multiple methods when investigating applied professional problems (Cohen, Manion and Morrison, 2018). In this research, combining experiential accounts with measurable self-reported changes provides a balanced framework for examining both the implementation and the perceived outcomes of the vocal routine. The selected paradigm, therefore, reflects the dual nature of the research question: exploring both teachers' lived experiences of the intervention and the perceived changes in vocal function associated with its implementation.

Research Methodology

To address the research question, this study adopts a mixed-methods research methodology combining quantitative self-report measures with qualitative reflective and interview data. Mixed-methods research allowed me to examine both measurable patterns and participants' subjective experiences, making it particularly suitable for investigating complex phenomena within professional practice (Cohen, Manion and Morrison, 2018).

The research question contains two complementary components. The first focuses on teachers' experiences of implementing the routine, which requires qualitative exploration of participants' reflections, interpretations, and contextual factors influencing their engagement with the exercises. The second component focuses on reported changes in vocal ease, endurance, and day-to-day workload tolerance, which can be examined through structured self-report measures collected before and after the intervention.

Vocal fatigue is widely recognised as both a physiological and perceptual phenomenon (Hunter and Titze, 2009). While physiological measures can capture aspects of vocal function, teachers often describe fatigue primarily in terms of sensations such as vocal effort, reduced endurance, or discomfort during sustained voice use. Consequently, self-report measures provide an appropriate method for evaluating perceived changes in vocal fatigue.

A purely quantitative design was considered during the development of the study. Such an approach could have involved acoustic voice measurements or clinical assessment of vocal function. However, these methods typically require specialised equipment and controlled environments that are not easily accessible for participants located across multiple countries. More importantly, objective acoustic measurements alone would not capture teachers' personal experiences of implementing the routine or their perceptions of changes in vocal comfort and workload tolerance. On the other hand, a purely qualitative design based exclusively on interviews could provide rich descriptions of participants' experiences but would not allow for structured comparison of vocal fatigue levels before and after the intervention. Given that the research question seeks to explore both experience and reported change, a mixed-methods design provides the most suitable methodological framework. The integration of quantitative and qualitative data allowed the study to address the research question more comprehensively, combining measurable indicators of perceived vocal fatigue with participants' detailed accounts of how the routine affected their daily teaching practice.

Research Methods

Participant Recruitment and Sample

Participants in this study are primary or elementary music teachers who experience vocal fatigue within their professional practice. The sample consisted of three participants recruited through professional networks within music education and voice training communities. The relatively small sample size reflects the practice-based nature of the research and allows the study to focus on detailed exploration of participants' experiences of implementing the routine. Small-scale intervention studies examining teachers' vocal training have successfully employed similar participant numbers to explore perceived outcomes and practical challenges of voice training programmes (Gillivan-Murphy et al., 2006). Participants were recruited from educational contexts within the United Kingdom, the United States, and the Slovak Republic. Although the educational systems in these countries differ, the professional demands placed on music teachers' voices remain comparable. Including participants from multiple contexts allows the study to explore whether the routine can be implemented across varied teaching environments. To ensure relevance to the research question, participants were required to meet several inclusion criteria. Participants needed to be currently working as music teachers in primary or elementary educational settings and to report experiencing symptoms of vocal fatigue, such as vocal tiredness, reduced endurance, or increased vocal effort during teaching.

Intervention Design

The central element of the study is the implementation of a structured routine combining exercises drawn from both singing pedagogy and clinical voice therapy. The intervention was designed

specifically to address the research question by examining whether such a combined routine can influence teachers' perceptions of vocal ease, endurance, and tolerance of daily vocal workload. Clinical voice therapy exercises have demonstrated effectiveness in improving vocal efficiency and reducing symptoms of voice disorders among teachers (Stemple, Roy and Klaben, 2014). Exercises such as Vocal Function Exercises aim to balance and strengthen the laryngeal musculature through structured phonation tasks (Stemple, Angadi and Croake, 2019). These exercises focus on improving coordination between respiration, phonation, and resonance.

Singing pedagogy similarly emphasises efficient breath management and resonance balance as fundamental components of sustainable voice use (Miller, 1996). These principles are widely applied in professional vocal training and may help reduce unnecessary muscular tension during voice production. By integrating elements from both domains, the intervention aimed to provide teachers with a practical routine that supports vocal efficiency during everyday teaching activities. Rather than presenting isolated exercises, the programme combines therapeutic and pedagogical techniques into a structured sequence that participants can integrate into their weekly routines.

Participants received recorded demonstrations and written instructions to support independent practice throughout the intervention period. The routine was designed to be manageable within teachers' existing workloads. Participants were asked to practise the exercises regularly over a six- to eight-week period; however, this had to be reduced initially to two weeks, and at the end to one week due to the busy time of their school year.

Data Collection

Data collection methods were selected specifically to address both components of the research question: teachers' experiences of the routine and their reported changes in vocal function. Three primary methods were used: surveys, reflective journals, and semi-structured interviews.

Pre- and Post-Intervention Surveys

Participants obtained instructions along with the recorded videos and completed a post-survey with information that included a comparison of their vocal situation before and after conducting one week of exercises. The survey assessed perceived vocal fatigue, vocal effort, endurance, and tolerance of the vocal workload before and after, using Likert-scale ratings. Self-report surveys are widely used in voice research because vocal fatigue is strongly linked to subjective perceptions rather than purely objective acoustic parameters (Hunter and Titze, 2009). These surveys allowed participants to evaluate their own experiences of vocal effort and endurance within their professional contexts. Within the framework of the research question, the surveys specifically addressed the component relating to reported changes in vocal ease, endurance, and workload tolerance. By comparing responses before and after the intervention, the study can identify patterns indicating whether participants perceived improvements in these areas.

Semi-Structured Interviews

At the end of the intervention, participants were invited to participate in a semi-structured interview lasting approximately 20-30 minutes. The interviews explored participants' overall experiences of the programme, including perceived benefits, challenges in maintaining the routine, and any observed changes in vocal endurance during teaching. Semi-structured interviews allow participants to describe their experiences in detail while enabling the researcher to explore themes emerging from earlier survey and journal data (Cohen, Manion and Morrison, 2018). This method therefore provides deeper insight into how participants interpret the impact of the routine on their vocal health and teaching practice.

Data Analysis

Quantitative survey data were analysed using descriptive statistics. Mean scores and percentage differences between pre- and post-intervention responses were calculated to identify patterns in perceived vocal fatigue, vocal ease, and endurance. Qualitative data from interviews were analysed using thematic analysis. This method involves systematically coding data and identifying recurring themes across participants' responses (Cohen, Manion and Morrison, 2018). Thematic analysis allows the researcher to examine how teachers describe the experience of implementing the routine and whether similar patterns emerge in their perceptions of vocal improvement. Integrating these two forms of analysis allows the study to explore both measurable trends and detailed experiential insights related to the research question.

Ethics and Insider Research

The research was conducted in accordance with the ethical guidelines of the University of Wales Trinity Saint David (2022) and the ethical principles outlined by the American Psychological Association (2017). Participation in the study was voluntary, and all participants provided informed consent prior to involvement. Participants received an information sheet explaining the purpose of the research, the procedures involved, and their right to withdraw at any time without consequence. Confidentiality was maintained through anonymisation of all participant data. Pseudonyms were used during analysis and reporting, and all digital data were stored securely in password-protected files.

As an insider researcher (DeLyser, 2001) with a background in voice training and music education, I will have a contextual understanding of the vocal demands experienced by teachers. However, insider research may also introduce potential bias, particularly if the researcher assumes shared understanding or interprets participants' responses through personal experience. To address this issue, I will adopt reflective practice throughout the research process. Following Schön's (1983) concept of the reflective practitioner.

Findings and Discussion

Introduction to the Findings

This section presents the findings of the study investigating how teachers experiencing vocal fatigue perceived the implementation of a combined singing-pedagogy and voice-therapy routine, and what changes they reported in relation to vocal ease, endurance and tolerance of day-to-day vocal workload. In accordance with the mixed-methods design outlined in the methodology, the findings draw on both quantitative self-report measures and qualitative participant reflections. The purpose of the findings is not only to establish whether participants' numerical scores increased or decreased, but to examine how the participants experienced the routine and what changes they perceived in relation to vocal fatigue, vocal ease, endurance and the demands of their working lives. This reflects the mixed-methods approach established in the methodology, in which quantitative self-report ratings are considered alongside qualitative accounts of participants' experiences. The original methodology identified descriptive statistics, including mean scores and percentage differences, as appropriate for the small practice-based sample, while qualitative material was intended to be examined through thematic analysis.

My available dataset includes responses from three participants. This is smaller than the originally anticipated sample of approximately four to nine participants. The findings should consequently be interpreted as a small-scale exploratory account rather than as evidence that can be generalised to teachers as a wider population. This is particularly important because the purpose of the study is centred on participants' perceived experiences of implementing a routine rather than on establishing a statistically generalisable treatment effect.

The quantitative findings are presented first. These include the participants' ratings of vocal fatigue and comfort, ease of implementation, perceived impact, pre- and post-programme numerical ratings of vocal fatigue and ease of phonation/speaking, and overall programme usefulness. The survey itself used five-point Likert responses ranging from 1, *strongly disagree*, to 5, *strongly agree*, together with 0–10 numerical ratings for selected outcomes. The analysis follows the descriptive approach specified in the methodology and focuses primarily on individual patterns, followed by comparison across the three participants.

Qualitative data were available for Participants 1 and 2. These consisted of open reflections concerning perceived changes in the voice, useful exercises or strategies, challenges encountered during the programme, and participants' experiences of incorporating the routine into their existing schedules. Participant 2 additionally provided weekly reflections and further comments regarding their experience of the programme. Although Participant 3 completed the quantitative survey, qualitative reflection data were not obtained. Participant 3 was therefore included in the quantitative analysis but not in the qualitative thematic analysis.

Given the small sample of three participants, the quantitative findings are presented descriptively rather than deductively. Means, individual scores and changes between pre- and post-programme numerical ratings are used to identify patterns within the sample. Particular attention is also given to individual variation, as group means can obscure differences between participants in a sample of this size. The qualitative material from Participants 1 and 2 was examined thematically to identify patterns relating to perceived vocal change, implementation, barriers, vocal self-care and intentions regarding continued use.

Participant Overview and Available Data

Three participants completed the quantitative component of the study following one week of implementing the combined singing-pedagogy and voice-therapy routine. All three participants therefore contributed to the descriptive quantitative analysis.

The available dataset was not identical for every participant. Participants 1, 2 and 3 completed the Likert-scale sections of the post-intervention survey and supplied numerical ratings of vocal fatigue and programme usefulness. Participant 1 provided an after-intervention rating for ease of phonation/speaking but did not provide the corresponding before-intervention score. Consequently, Participant 1 could not be included in the calculation of change for this particular measure.

Qualitative data were available from Participants 1 and 2. Participant 1 provided responses to open reflection questions addressing perceived vocal changes, helpful aspects of the routine, implementation challenges and intentions regarding future use. Participant 2 also provided open reflections and additional comments describing their experience of incorporating the routine into an already demanding schedule. Participant 3 did not provide qualitative responses. Therefore, statements concerning qualitative experiences in this chapter relate specifically to Participants 1 and 2. I included the following table of distinctions for more precise interpretation.

Data source:	Participant 1:	Participant 2:	Participant 3:
Post-intervention Likert survey	Available	Available	Available
Vocal fatigue before/after	Available	Available	Available
Ease of phonation before/after	After only	Available	Available
Programme usefulness	Available	Available	Available
Qualitative reflection	Available	Available	Not obtained
Included in quantitative analysis	Yes	Yes	Yes
Included in qualitative analysis	Yes	Yes	No

Quantitative Findings: Reported Changes Following One Week

Vocal Fatigue and Comfort

The first group of survey statements examined participants' perceptions of vocal fatigue and comfort following the one-week implementation. Six items addressed reduced fatigue during teaching, comfort during prolonged speaking, vocal endurance, throat discomfort or strain, physical speaking effort, and recovery following teaching.

Statement:	P1:	P2:	P3:	Mean:
Less vocal fatigue during teaching	4	4	5	4.33
Voice more comfortable during prolonged speaking	4	4	4	4.00
Improved vocal endurance	4	4	5	4.33
Less throat discomfort/strain	3	4	4	3.67
Speaking required less physical effort	3	3	4	3.33
Faster recovery following teaching	4	4	4	4.00
Participant mean	3.67	3.83	4.33	3.94

Responses were generally positive, with an overall mean of 3.94 out of 5. The highest-rated items were reduced vocal fatigue and improved vocal endurance, both of which received a mean score of 4.33. Participants 1 and 2 agreed that they experienced less fatigue and improved endurance, while Participant 3 strongly agreed with both statements. Comfort during prolonged speaking and faster recovery following teaching each received a mean score of 4.00. All three participants agreed with these statements, suggesting a consistent positive perception of these aspects of vocal use during the one-week period. The lowest-rated item concerned the amount of physical effort required for speaking, which received a mean of 3.33. Participants 1 and 2 selected a neutral response, while Participant 3 agreed. Reduced throat discomfort or strain also produced a comparatively lower mean of 3.67. The pattern therefore indicates that participants reported the strongest perceived changes in relation to vocal fatigue and endurance, whereas changes in physical speaking effort and throat discomfort were less consistently perceived. This distinction is important because it suggests that participants did not simply provide uniformly positive responses across every aspect of vocal function. At individual level, Participant 3 produced the highest mean response in this section at 4.33, followed by Participant 2 at 3.83 and Participant 1 at 3.67. The results therefore also indicate variation in the degree of perceived change between participants.

Change in Self-Reported Vocal Fatigue

Participants rated their average vocal fatigue before beginning the routine and following the one-week implementation using a numerical scale from 0 to 10, where 0 represented no fatigue and 10 represented extreme fatigue.

Participant	Before	After	Change	Descriptive reduction
Participant 1	9	7	-2	22.2%
Participant 2	3	1	-2	66.7%
Participant 3	8	4	-4	50.0%
Mean	6.67	4.00	-2.67	40.0%

The value 40% has been calculated from the difference between the group's before- and after-the intervention. All three participants reported lower levels of vocal fatigue after one week of using the routine. The mean score decreased from 6.67 before implementation to 4.00 afterwards, representing a mean absolute reduction of 2.67 points. Relative to the initial group mean, this corresponds to a descriptive reduction of 40%. However, the individual results demonstrate significant differences in starting fatigue. Participant 1 began with the highest fatigue score of 9/10 and reported 7/10 after one week. Participant 2 began with considerably lower fatigue at 3/10 and reported 1/10 afterwards. Participant 3 reported the largest absolute change, decreasing from 8/10 to 4/10. Because of the small sample, the percentage changes should be interpreted descriptively rather than as evidence of intervention effectiveness. More importantly, the direction of change was consistent across all three cases: each participant reported less vocal fatigue after the one-week implementation than before it.

Participant 1's qualitative response provides additional context for this numerical finding. The participant particularly noticed the value of the exercises when fatigue developed later in the day: "When I started to have the fatigue in the afternoon, and did these exercises, I just feel less fatigue and the voice just feels better" (Participant 1, post-intervention reflection). The participant further stated: "The afternoon exercise is the really important for me" (Participant 1, post-intervention reflection). This suggests that Participant 1 perceived the routine as useful for managing fatigue once it had already emerged during the working day. The participant's after-intervention score remained relatively high at 7/10, meaning that the finding should not be interpreted as elimination of vocal fatigue. Rather, the participant reported a reduction in fatigue alongside a perceived strategy for managing it.

Participant 2's experience provides a contrasting perspective. The participant explained: "At the present time my voice is not fatigued and I feel balanced" (Participant 2, open reflection). They nevertheless reported that they "did feel the improvement," while explaining that the improvement "wasn't huge" because their starting point was already relatively good (Participant 2, open

reflection). This corresponds with Participant 2's comparatively low initial fatigue rating of 3/10 and demonstrates the importance of considering individual starting points when interpreting the numerical changes.

Vocal Ease

Ease of phonation or speaking was rated from 0 to 10, with higher scores indicating greater ease. Participant 1 provided an after-intervention score of 7/10 but did not provide a corresponding before-intervention score. Change for Participant 1 therefore could not be calculated.

Self-reported ease of phonation/speaking

Participant	Before	After one week	Change
Participant 1	Not provided	7	—
Participant 2	3	1	-2
Participant 3	3	8	5
Complete-case mean	3.00	4.50	1.50

Unlike vocal fatigue, the results for vocal ease were not consistent. Participant 3 reported a substantial increase in ease from 3/10 to 8/10. In contrast, Participant 2's score decreased from 3/10 to 1/10. Although the mean of the two complete cases increased from 3.00 to 4.50, this average conceals two markedly different individual trajectories and should therefore not be interpreted as evidence of consistent improvement. Participant 2's decrease in reported ease is particularly noteworthy because it occurred alongside several positive findings. The participant reported lower fatigue, perceived some improvement in their qualitative reflection, and rated the overall usefulness of the routine at 10/10. Nevertheless, the ease rating must be retained and interpreted as recorded. The available qualitative data do not explain this discrepancy. It would therefore be inappropriate to assume that the response resulted from misunderstanding of the scale or an entry error. Participant 1's after-intervention rating of 7/10 indicates relatively positive ease at the end of the one-week period, but the missing starting score means that no change can be established for this participant. Consequently, while the fatigue data show a consistent directional pattern, the findings relating to vocal ease are mixed.

Vocal Endurance and Recovery

Perceived vocal endurance was one of the most positively rated aspects of the intervention. Participants 1 and 2 agreed that their vocal endurance had improved, while Participant 3 strongly agreed, resulting in a mean score of 4.33. Recovery following teaching was also rated positively. All three participants agreed that their voice recovered more quickly following teaching, resulting in

a mean of 4.00. Participant 1's qualitative account provides additional insight into these ratings. The participant specifically described using the exercises when fatigue developed in the afternoon and experiencing the voice as feeling better afterwards (Participant 1, post-intervention reflection). This suggests that the routine was perceived as useful not only as preparation before vocal activity but also as a strategy that could be used during the working day. However, these findings represent participants' perceptions after one week of use. They therefore indicate early perceived changes in endurance and recovery, rather than demonstrating longer-term development of vocal endurance.

Day-to-Day Workload Tolerance

Day-to-day workload tolerance was reflected across several measures, including comfort during prolonged speaking, endurance throughout the teaching day, recovery following teaching and numerical fatigue. The overall pattern was positive. Comfort during prolonged speaking received a mean of 4.00, improved endurance received 4.33, and faster recovery following teaching received 4.00. In addition, all three participants reported lower numerical fatigue after one week.

Participant 1's qualitative account suggests that the routine could be incorporated at a point of increased vocal demand during the working day. Rather than describing an absence of fatigue, the participant emphasised the usefulness of the exercises when afternoon fatigue emerged. Participant 2's account illustrates a different situation. The participant began the study with comparatively low fatigue and described their voice as relatively balanced. Their experience therefore suggests that the routine could also be perceived as useful when substantial vocal fatigue was not present at baseline. Participant 3 showed the largest quantitative fatigue reduction, from 8/10 to 4/10. However, because Participant 3 did not provide qualitative reflection data, it is not possible to determine how this participant experienced the change in relation to their everyday vocal workload. Taken together, the findings indicate positive short-term perceptions of workload tolerance, while also showing that the participants entered the one-week implementation with different levels of vocal fatigue.

Ease of Programme Implementation

The second group of Likert-scale questions examined the practical implementation of the routine. Participants evaluated whether the exercises were easy to understand, whether the demonstrations and instructions were helpful, whether the routine could fit into their schedules, whether they were able to complete it consistently, and whether they intended to continue using elements of it.

Statement	P1	P2	P3	Mean
Exercises easy to understand	5	5	5	5.00
Recorded demonstrations helpful	5	5	5	5.00

Written instructions clear	5	5	5	5.00
Routine fitted realistically into schedule	5	5	5	5.00
Able to complete exercises consistently	5	5	5	5.00
Would continue using parts of routine	5	5	5	5.00
Overall mean	5.00	5.00	5.00	5.00

This was the most consistent quantitative finding. All three participants selected Strongly Agree for every statement relating to implementation. The qualitative responses from Participants 1 and 2 support this finding. Participant 1 described the exercises as: “short and sweet” (Participant 1, post-intervention reflection), and also referred to them as: “very approachable” (Participant 1, post-intervention reflection). Participant 2 similarly emphasised the brevity of the routine: “I really liked how short and concise this workout was” (Participant 2, open reflection). Participant 2's comment is particularly relevant because the participant also described having an “extremely hectic schedule” (Participant 2, open reflection). The brevity of the routine therefore appears to have contributed to its perceived practicality. The quantitative and qualitative evidence consequently converge strongly in relation to accessibility and feasibility during the one-week implementation.

Perceived Impact

The third group of Likert-scale statements examined participants' perceptions of greater awareness of vocal habits, positive effects on teaching experience, confidence in managing fatigue and overall vocal wellbeing.

Statement	P1	P2	P3	Mean
Greater awareness of vocal habits	5	3	5	4.33
Positive effect on teaching experience	4	3	5	4.00
Greater confidence managing vocal fatigue	4	3	5	4.00
Supported overall vocal wellbeing	4	5	4	4.33
Participant mean	4.25	3.50	4.75	4.17

The overall mean of 4.17 indicates generally positive perceptions, although the responses were more varied than those concerning programme implementation. Greater awareness of vocal habits and support for overall vocal wellbeing received the highest mean scores, at 4.33. Positive effects on teaching experience and greater confidence in managing vocal fatigue both received means of 4.00. Participant 2's responses provide an interesting example of the value of combining quantitative and qualitative data. Participant 2 gave neutral ratings for increased awareness,

teaching experience and confidence, but strongly agreed that the routine supported overall vocal wellbeing. The participant explained that many of the exercises were already familiar: “I know many of the exercises and use them daily for students” (Participant 2, additional reflection). However, the participant also acknowledged: “I don’t always take time for myself” (Participant 2, additional reflection). This suggests that the value of the one-week routine for Participant 2 may have involved applying existing knowledge more consistently to personal vocal care rather than learning entirely new vocal strategies. Participant 3 produced the highest overall perceived-impact mean at 4.75. As no qualitative reflection was obtained, the reasons for these particularly positive responses cannot be established.

Overall Usefulness

Participants rated the overall usefulness of the routine on a scale from 0 to 10.

Participant	Usefulness
Participant 1	8/10
Participant 2	10/10
Participant 3	10/10
Mean	9.33/10

Overall usefulness was rated highly, with a group mean of 9.33/10. Participant 1 described the routine as: “a valuable tool” (Participant 1, post-intervention reflection). Participant 2 similarly described the opportunity to devote time to personal vocal care as particularly valuable: “To be reminded that I can take just a few minutes to take care of my own voice and myself was really valuable” (Participant 2, additional reflection). Participant 3 also rated usefulness at 10/10. However, without qualitative reflection data, the specific reasons for this rating cannot be established. Importantly, high usefulness ratings were present even where individual vocal outcomes were not uniformly positive. Participant 2, for example, rated usefulness at 10/10 despite reporting lower ease of phonation after the week. This suggests that participants' perceptions of usefulness may have encompassed aspects such as accessibility, self-care, fatigue management and practicality rather than depending upon improvement in every measured vocal outcome.

Qualitative Findings: Participants' Experiences of the Routine

Qualitative findings were derived from the reflections provided by Participants 1 and 2. Participant 3 did not provide qualitative reflection data and was therefore not included in this component of the analysis. Analysis of the available responses identified five interconnected themes: perceived vocal benefit and management of fatigue; brevity, accessibility and preferred exercises; the programme as a prompt for vocal self-care; time and consistency; and intention to continue the routine. Given that qualitative material was available from only two participants and covered a short

implementation period, these themes represent patterns within the available accounts rather than evidence of thematic saturation.

Perceived Vocal Benefit and Management of Fatigue

The first theme concerned participants' perceptions of vocal benefit and their ability to manage fatigue. Participant 1 reported a noticeable response when the exercises were performed after fatigue had emerged: "When I started to have the fatigue in the afternoon, and did these exercises, I just feel less fatigue and the voice just feels better" (Participant 1, post-intervention reflection). The participant particularly emphasised the importance of the afternoon exercises. This indicates that the routine was perceived as something that could be applied during the working day in response to developing vocal fatigue. Participant 2 also reported improvement but contextualised it in relation to a comparatively good starting point. The participant explained that their voice was not particularly fatigued and felt balanced at the time of participation. Although improvement was perceived, the participant did not consider it substantial because the initial vocal condition was already relatively good (Participant 2, open reflection). These accounts suggest that participants' perceptions of change were influenced by their starting vocal condition. Participant 1 described managing considerable existing fatigue, whereas Participant 2 described a comparatively balanced starting point.

Brevity, Accessibility and Preferred Exercises

The practical characteristics of the routine formed a second prominent theme. Participant 1 described the exercises as "short and sweet" and "very approachable" (Participant 1, post-intervention reflection). The participant also reported enjoying the exercises because they "feel good" and described them as "good vocal hygiene" (Participant 1, post-intervention reflection). Participant 2 independently emphasised the brevity of the routine, describing it as "short and concise" (Participant 2, open reflection). Participant 2 also identified a specific exercise preference: "My favourite was the lip trill glides" (Participant 2, open reflection). These findings correspond closely with the maximum quantitative implementation scores. The available qualitative accounts suggest that the short duration and straightforward nature of individual exercises were important elements of participants' positive experiences of implementation.

The Routine as a Prompt for Vocal Self-Care

A particularly clear theme across both qualitative accounts was the role of the intervention in encouraging participants to prioritise their own vocal care. Participant 1 explained: "I have been meaning to do this, but then when your study came into my life, it reminded me to do it" (Participant 1, post-intervention reflection). The participant's account suggests that establishing a routine was something they had previously considered but had not consistently implemented. Participant 2 described a similar experience despite already knowing many of the exercises. The participant explained that they regularly used such exercises with students but did not always take equivalent

time for personal vocal practice: “I don’t always take time for myself” (Participant 2, additional reflection). The participant particularly valued being reminded that vocal self-care did not necessarily require a lengthy practice session: “To be reminded that I can take just a few minutes to take care of my own voice and myself was really valuable” (Participant 2, additional reflection). Across the two accounts, therefore, the one-week routine appeared to serve not only as a collection of exercises but also as a prompt to prioritise personal vocal care.

Time and Consistency

Despite the highly positive quantitative ratings concerning implementation, the qualitative responses showed that finding or remembering to make time for the routine remained a practical issue. Participant 1 identified remembering to practise as a challenge and suggested: “I should set my alarm every day, like 4 o’clock in the afternoon and just do it” (Participant 1, post-intervention reflection). The participant also suggested that reminders or alerts could support continued practice. Participant 2 identified time as the main implementation challenge: “Main challenge was finding time at the end of the year of University semesters and exams and all that” (Participant 2, open reflection). This does not necessarily contradict the maximum quantitative rating for realistic schedule fit. Instead, it suggests a distinction between the routine being sufficiently short and manageable and the broader challenge of prioritising personal vocal care within an already demanding schedule. The qualitative data therefore indicate that the main implementation difficulty was not understanding or performing the exercises. Rather, it concerned remembering and protecting time to complete them consistently.

Intention to Continue

The final theme concerned participants' intentions regarding continued use beyond the one-week implementation. Participant 1 stated: “I think that this is something I want to continue” (Participant 1, post-intervention reflection). The participant nevertheless connected continued use with the need for reminders, proposing alarms or alerts as a means of maintaining regular practice. Participant 2's additional reflection also indicated that the participant valued making time for their own voice and appreciated the opportunity to re-engage personally with exercises already familiar from their professional practice. These qualitative findings correspond with the quantitative results, in which all three participants strongly agreed that they would continue using parts of the routine. The evidence therefore demonstrates positive intention towards continued use. Since the data cover one week, however, the findings concern intention rather than demonstrating actual longer-term adherence or sustainability.

Integration of Quantitative and Qualitative Findings

Integration of the two forms of data revealed several areas of convergence, as well as one important area of divergence.

Area	Quantitative evidence	Qualitative evidence	Relationship
Vocal fatigue	All three reported lower fatigue	P1 described reduced afternoon fatigue; P2 perceived improvement from a relatively good baseline	Convergence
Endurance	Mean 4.33/5	P1 described benefit when fatigue developed later in the day	Convergence
Vocal ease	P2: 3→1; P3: 3→8; P1 baseline unavailable	Available reflections do not explain the difference	Divergence
Accessibility	All implementation items 5/5	“Short and sweet”; “short and concise”; “very approachable”	Strong convergence
Schedule fit	All participants 5/5	P1 discussed remembering; P2 discussed finding time	Complementarity
Vocal self-care	Positive perceived-impact scores	Both qualitative participants described the routine as a reminder to care for their own voice	Convergence
Continued use	All participants 5/5	P1 explicitly wanted to continue; P2 valued renewed personal practice	Convergence
Usefulness	Mean 9.33/10	Both qualitative participants described aspects of the routine as valuable	Convergence

Convergence in Vocal Fatigue and Endurance

The clearest convergence concerned vocal fatigue. Quantitatively, every participant reported lower fatigue after one week, with the mean decreasing from 6.67 to 4.00. Qualitatively, Participant 1 explicitly described experiencing less fatigue after performing the exercises when afternoon fatigue emerged. Participant 2 also perceived improvement but contextualised this against a relatively good starting condition. The endurance ratings showed a similarly positive pattern, with a mean of 4.33. Participant 1's description of using the routine when fatigue accumulated later in the day provides an experiential example that complements this quantitative result. Taken together, the data suggest that fatigue management and endurance were among the most consistently positive early outcomes reported by participants.

Strong Convergence in Accessibility

The strongest convergence across the dataset concerned accessibility and practical implementation. All three participants gave maximum ratings to every implementation item. This was supported by Participant 1's descriptions of the exercises as “short and sweet” and “very approachable,” and Participant 2's description of the workout as “short and concise.” The qualitative evidence therefore reinforces rather than merely repeats the quantitative result. It identifies brevity and approachability as particular characteristics contributing to participants' positive perceptions of feasibility.

Vocal Self-Care and the Reminder Function

The qualitative findings also add an aspect that is not fully captured by the numerical scores: the intervention's role as a reminder to engage in vocal self-care. Both qualitative participants indicated that the issue was not necessarily lack of knowledge. Participant 1 had previously intended to establish a routine but forgot to do so consistently, while Participant 2 already knew and taught many of the exercises but did not always prioritise personal practice. The one-week intervention therefore appears to have provided structure and a prompt for action, alongside the exercises themselves. This may help explain the high usefulness ratings despite variation in individual vocal outcomes.

Complementarity Between Schedule Fit and Time Challenges

All participants strongly agreed that the routine fitted realistically into their schedules. At first sight, this appears inconsistent with Participant 1's comments about forgetting and Participant 2's difficulty finding time. The qualitative accounts, however, suggest complementarity rather than contradiction. Participants appeared to consider the routine itself manageable because it was brief, while still experiencing the wider difficulty of prioritising vocal self-care within demanding personal and professional schedules. This distinction is important. A routine can be perceived as practically feasible while adherence still requires conscious prioritisation and reminders.

Divergence in Vocal Ease

The clearest divergence concerned ease of phonation. Participant 3 reported improvement from 3/10 to 8/10, whereas Participant 2's score decreased from 3/10 to 1/10. Participant 1's missing baseline prevented calculation of change. Participant 2's result is particularly important because other measures were positive: fatigue decreased, overall wellbeing was positively rated and programme usefulness was rated at 10/10. The available qualitative data do not explain the decrease in phonatory ease. The result should therefore remain as an unresolved divergence rather than being treated as an error. Consequently, the one-week findings support a consistent pattern in reported fatigue reduction, but not a consistent pattern of improvement in vocal ease.

Individual Participant Patterns

The small sample makes individual trajectories particularly important. Participant 1 began with the highest fatigue score at 9/10 and reported 7/10 after the week. Although substantial fatigue remained, the participant described experiencing less fatigue and a better-feeling voice after completing the exercises in the afternoon. Participant 1 also valued the accessibility of the exercises and expressed an intention to continue, while identifying reminders as potentially important for maintaining practice. Participant 2 began with considerably lower fatigue at 3/10 and reported 1/10 after the week. The participant explained that their voice had already felt comparatively balanced, helping to contextualise why the perceived improvement was described

as relatively modest. For this participant, a particularly important aspect of the intervention appeared to be the reminder to devote time to personal vocal care. The participant also identified lip-trill glides as a preferred exercise. At the same time, the decrease in phonatory ease from 3/10 to 1/10 represents an important contradictory finding. Participant 3 reported the largest numerical reduction in fatigue, from 8/10 to 4/10, as well as a substantial increase in vocal ease from 3/10 to 8/10. The participant also rated usefulness at 10/10 and provided strongly positive Likert-scale responses. However, because qualitative data were not obtained, the reasons underlying these numerical changes cannot be established. The three cases therefore demonstrate why the findings should not be reduced to group averages alone. Participants began with different levels of fatigue and reported different patterns of change during the one-week implementation.

Discussion and conclusion

The clearest quantitative pattern in the study was the reduction in self-reported vocal fatigue. All three participants reported lower fatigue after the one-week implementation period, with the group mean decreasing from 6.67/10 to 4.00/10. Participant 1 decreased from 9/10 to 7/10, Participant 2 from 3/10 to 1/10 and Participant 3 from 8/10 to 4/10. Although conclusions cannot be generalised from three participants, the consistency in the direction of change is noteworthy. This finding is relevant to the wider literature because teachers are recognised as a professional group at increased risk of voice problems associated with sustained occupational voice use. Cantor Cutiva, Vogel and Burdorf (2013), in a systematic review of teacher voice disorders, found that teachers report voice problems more frequently than people in many other occupations and identified factors such as classroom noise and habitual loud speaking as recurrent occupational risks. More recently, Moreno, Calvache and Cantor-Cutiva (2025) concluded that vocal fatigue is prevalent among teachers and is associated with occupational demands including classroom noise and elevated speaking intensity. These findings provide a useful context for the current study. Vocal fatigue is unlikely to result from a single isolated factor; rather, it develops within the cumulative demands of repeated speaking, projection and restricted opportunities for recovery. This supports the rationale for investigating a routine that teachers can integrate into working days rather than relying solely on rest or avoidance of voice use.

Participant 1's description of using the exercises when afternoon fatigue developed is particularly relevant in this respect. The participant reported feeling less fatigued and experiencing the voice as feeling better after completing the exercises (Participant 1, post-intervention reflection). Rather than suggesting that fatigue disappeared, this account indicates that the routine may have been experienced as a strategy for responding to fatigue during the working day. This distinction is important because occupational voice users such as teachers often cannot simply stop speaking when symptoms appear.

The concept of vocal fatigue as a subjective experience also supports the use of self-report data in this study. Nanjundeswaran et al. (2015), in developing and validating the Vocal Fatigue Index, demonstrated the importance of capturing individuals' perceived experiences of tiredness, effort

and recovery rather than relying exclusively on acoustic measurements. The present study did not employ the full Vocal Fatigue Index, but its focus on participants' perceptions of fatigue, effort and recovery is consistent with the broader recognition that vocal fatigue contains an important perceptual component. The results should nevertheless not be interpreted as demonstrating physiological recovery or structural change in the vocal mechanism after one week. Moreno, Calvache and Cantor-Cutiva (2025) specifically note the continuing need for objective measures to complement self-report when studying vocal fatigue. Consequently, the present results are best understood as evidence that the participants **perceived** less fatigue after using the routine.

One of the strongest findings concerned the practicality of the intervention. All three participants selected the maximum score for every implementation item, including clarity of instructions, ease of understanding, schedule fit and intention to continue. The qualitative findings reinforce this result. Participant 1 described the exercises as “short and sweet” and “very approachable”, while Participant 2 valued the fact that the routine was “short and concise”. This is an important finding because the usefulness of any occupational voice intervention depends partly upon whether it can realistically be incorporated into professional routines. Teachers' vocal problems are associated not only with voice-production behaviours but also with workplace conditions and cumulative occupational demands (Cantor Cutiva, Vogel and Burdorf, 2013). An intervention that is theoretically effective but too time-consuming to implement may have limited practical value within teaching environments. Participant 2's comments illustrate this issue particularly clearly. The participant described an extremely demanding schedule and identified finding time as the principal challenge, yet still rated the routine as realistically fitting into the schedule. This apparent contradiction is better understood as complementarity between the quantitative and qualitative data. The routine itself was perceived as manageable because it was brief; the challenge was protecting even a small amount of time for personal vocal care. This distinction has implications for future programme design. The findings suggest that **brevity may be an important facilitator of adherence**, but brevity alone does not guarantee that practice will occur. Participants may still require prompts, reminders or deliberate integration into the working day.

The integration of quantitative and qualitative findings was particularly useful in understanding the participant responses. Fetters, Curry and Creswell (2013) argue that the value of mixed-methods research lies not simply in collecting two types of data, but in deliberately integrating them so that convergence, complementarity and divergence can be identified. This was evident in several aspects of the present study. The reduction in fatigue ratings converged with Participant 1's description of feeling less fatigued following the exercises. The maximum implementation ratings were complemented by qualitative explanations identifying brevity and approachability as specific reasons for positive engagement. Conversely, Participant 2's reduced phonatory-ease score diverged from the participant's generally positive evaluation of the programme. Without qualitative data, Participant 2's high schedule-fit score might have suggested that time presented no difficulty. The reflection data instead showed that the routine was perceived as manageable despite substantial time pressure. Similarly, the high usefulness scores alone would not have revealed the

importance participants attached to being reminded to care for their own voices. The mixed-methods approach therefore allowed the study to examine not simply whether participants reported change, but also **how they interpreted the routine within the realities of their professional and personal lives.**

Limitations

Several limitations must be considered. Most importantly, the sample consisted of only three participants, with qualitative data available from two. The findings therefore cannot be generalised to the wider population of teachers experiencing vocal fatigue. The one-week implementation period also means that the results represent immediate or early perceptions. Longer-term behavioural adaptation, sustained adherence and changes in vocal function cannot be established from the current dataset. This is particularly important because previous teacher voice intervention research has frequently examined outcomes over longer treatment periods, such as the six-week intervention reported by Roy et al. (2002). The study also relied on self-report measures. This was appropriate for investigating perceived fatigue and participant experience, but it cannot establish physiological or acoustic change. Future research could strengthen the design through validated instruments such as the Vocal Fatigue Index alongside acoustic or clinical measures where appropriate (Nanjundeswaran et al., 2015). There were also missing data. Participant 1 did not provide a baseline phonatory-ease score, and Participant 3 did not provide qualitative reflections. Participant 3 therefore showed strong quantitative improvement, but the reasons underlying that change remain unknown. Despite these limitations, the study provides useful exploratory evidence. The most consistent findings relate not to proof of clinical effectiveness but to **acceptability, perceived fatigue management, accessibility and the potential value of embedding voice-care exercises into everyday routines.**

An important conclusion from the study is therefore that practical vocal support for teachers may need to involve more than technical exercises alone. The participants' reflections suggest that knowing how to care for the voice does not necessarily result in regular self-care. Reminders, short practice periods and clear structure may be important in helping teachers incorporate vocal-health strategies into daily practice.

Recommendations

Future research should examine the routine over a longer period and with a larger participant group. A longer implementation would allow researchers to investigate whether early reductions in perceived fatigue are maintained, whether vocal-ease outcomes become more consistent, and whether participants continue practising once the novelty and external structure of study participation diminish. Repeated measurements across several weeks would also make it possible to observe patterns in adherence, workload and vocal response over time. Any future version of the programme should retain flexibility for individual needs. The variation in baseline fatigue and phonatory-ease responses indicates that a single routine may not affect all participants in the same

way. Individual adaptation, particularly for teachers with different vocal demands or existing voice difficulties, should therefore remain an important consideration. Overall, this study suggests that a brief combined singing-pedagogy and voice-therapy routine has potential as an accessible strategy for supporting teachers' vocal self-care. The most valuable next step is not to assume effectiveness from these preliminary findings, but to test the approach more extensively through longer-term, larger-scale and methodologically strengthened research.

Appendices

[Morning Activation Routine](#)

[Afternoon Recovery Routine](#)

Dual-Phase Training for Occupational Voice Users

Title: *Vocal Resilience Portfolio - Morning Activation and Afternoon Recovery Routines*

Purpose:

This portfolio is designed to support occupational voice users in preventing and managing vocal fatigue. It integrates evidence-based techniques from singing pedagogy and clinical voice therapy, providing short and practical routines that can be embedded into daily life.

General Guidance

- **Duration:** Each routine takes 5 - 10 minutes.
- **Environment:** Exercises can be performed quietly in classrooms, offices, or at home.
- **Equipment:** No equipment is required. A straw (optional) may enhance some tasks.
- **Frequency:** Morning activation before teaching/speaking. Afternoon recovery after heavy use.
- **Hydration:** Maintain hydration throughout the day; steam inhalation is optional for recovery.

Morning Activation Routine (~ 5 minutes)

Goal: Prepare the vocal system for occupational load, increasing efficiency and flexibility.

1. LIP BUBBLE SLIDES - These slides are ascending, to increase the blood flow, wake up the vocalisation, and prepare for the gradually increasing volume and flexibility of the voice for the day.
2. LIP BUBBLE RUNS - The same lip bubble technique applies to the lip bubble runs. Narrowing the voice work down (including all five tones) enhances the forward placement and stretches articulation. The resonance is turned on throughout this exercise.
3. V SLIDES - Connect the voice range from the bottom to the top. A “voice flip” is encouraged to feel the difference between chest and head voice control.

Afternoon Recovery Routine (~ 5 minutes)

Goal: Recalibrate, release tension, and restore vocal function after occupational use.

1. BLOW FISH SLIDES - The first part of the Afternoon Routine Exercises is using descending scales. Blowfish exercises balance the pressure below and above the vocal folds, allowing them to be free throughout. Let the voice drop and slide down.
2. V SLIDES - These V SLIDES are descending. Allowing the voice to settle and slide on the V fricative safely. A balance between the pressures is also maintained.
3. BUBBLE SLIDES - First bubble slides of the afternoon phase are descending. Dropping the voice down helps relax the voice.
4. ASCENDING BUBBLE SLIDES - The second part of the afternoon phase is strengthening. We are using ascending bubble slides and runs. All performed lightly, in medium dynamics, letting the voice function after vocal load and its release again.

Supportive Hygiene Recommendations

- Hydrate consistently throughout the day.
- Avoid shouting across noisy spaces; move closer instead.
- Use short vocal breaks where possible.
- Steam inhalation may assist recovery, but is supplementary.

Portfolio Features

- **Discreet:** Exercises can be done quietly and quickly.
- **Accessible:** Designed for non-singers and everyday contexts.
- **Evidence-Based:** Draws from clinical therapy (e.g., SOVT, fish blowing) and pedagogy (e.g., incremental sirens, breath focus).
- **Habitual:** Structured as morning and afternoon sessions to build a routine.

Closing Note

This artefact bridges scientific knowledge and practical application, embedding factual and conceptual knowledge into a usable format. It is intended as a preventative tool rather than a treatment resource, promoting resilience and sustainability for occupational voice users when performed daily.

Post-Programme Survey: Vocal Fatigue Intervention Programme for Teachers

Participant Information

Participant Name: _____

Teaching Context: _____

Instructions

Please answer the following questions based on your experience during the intervention programme. There are no right or wrong answers. Your responses will help evaluate the effectiveness, practicality, and sustainability of the vocal routine.

For the statements below, please tick (☑) the option that best represents your experience.

Likert Scale

Scale	Meaning
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

Section A: Vocal Fatigue and Comfort

Statement	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I experienced less vocal fatigue during teaching.	☐	☐	☐	☐	☐
My voice felt more comfortable during prolonged speaking.	☐	☐	☐	☐	☐
I noticed improved vocal endurance throughout the teaching day.	☐	☐	☐	☐	☐

I experienced less throat discomfort or strain.	☐	☐	☐	☐	☐
Speaking required less physical effort than before the programme.	☐	☐	☐	☐	☐
My voice recovered more quickly after teaching.	☐	☐	☐	☐	☐

Section B: Ease of Programme Implementation

Statement	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
The exercises were easy to understand.	☐	☐	☐	☐	☐
The recorded demonstrations were helpful.	☐	☐	☐	☐	☐
The written instructions were clear.	☐	☐	☐	☐	☐
The routine fit realistically into my teaching schedule.	☐	☐	☐	☐	☐
I was able to complete the exercises consistently.	☐	☐	☐	☐	☐
I would continue using parts of this routine in the future.	☐	☐	☐	☐	☐

Section C: Perceived Impact

Statement	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I became more aware of my vocal habits.	☐	☐	☐	☐	☐

The programme positively affected my teaching experience.	☐	☐	☐	☐	☐
I felt more confident managing vocal fatigue.	☐	☐	☐	☐	☐
The programme supported my overall vocal wellbeing.	☐	☐	☐	☐	☐

Numerical Rating Questions

Please rate the following from 0–10.

Question	Rating
Average level of vocal fatigue BEFORE the programme (0 = none, 10 = extreme)	_____
Average level of vocal fatigue AFTER the programme	_____
Ease of phonation/speaking BEFORE the programme (0 = very difficult, 10 = very easy)	_____
Ease of phonation/speaking AFTER the programme	_____
Overall usefulness of the programme	=====

Open Reflection Questions

1. What changes, if any, did you notice in your voice during the programme?

2. Which exercises or strategies did you find most helpful?

3. What challenges did you experience while completing the programme?

4. Would you recommend this programme to other teachers experiencing vocal fatigue?
Why or why not?

Weekly Reflection / Notes Pages

Week 1 Notes

- Vocal comfort this week:

- Fatigue levels after teaching:

- Ease of completing exercises:

- Additional reflections:

Week 2 Notes

- Vocal comfort this week:

- Fatigue levels after teaching:

- Ease of completing exercises:

- Additional reflections:

Additional Notes

Thank You

Thank you for taking part in this study. Your responses and reflections are valuable in understanding how structured vocal routines may support teachers experiencing vocal fatigue.

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