

BMPF7031F: Designing an Artefact
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Vocal Warm-Cards: A systematic application of best practices for Choral Musicians

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PROJECT PORTFOLIO

Introduction:

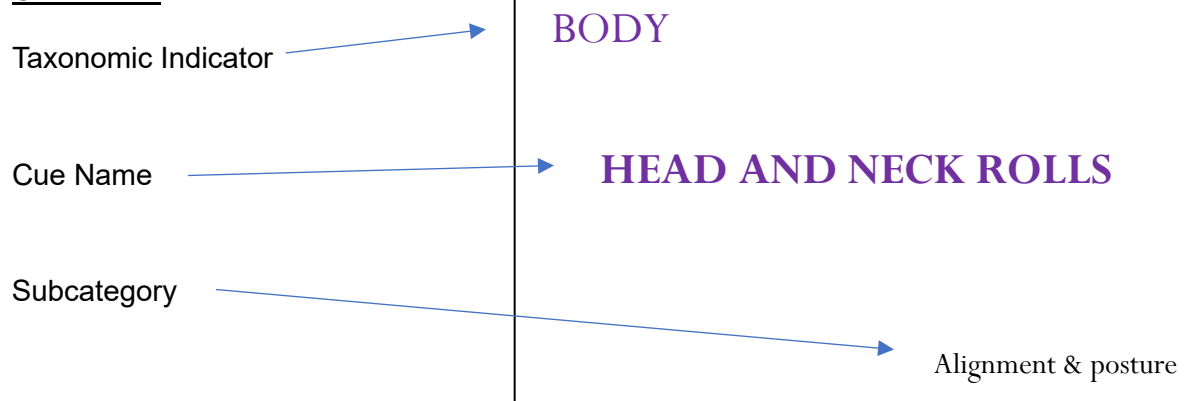
As a lifelong choral singer, educator, and conductor, I have experienced Vocal Warm-Ups (VWU) as a vital part of preparing the mind and body for singing, as well as teaching the foundational elements of voice production in a group setting (Smith and Sataloff, 2013; Katada, Yoshida and Kita, 2022). Vocal Warm-Ups usually comprise a series of exercises designed to promote physiological and technical ease (efficiency) during singing (Elliot, Sundberg, and Gramming, 1995) as well as encourage skill development and reduce the risk of vocal injury (Gish et al., 2012). In my practice, this includes dedicated time at the beginning of private voice lessons and choral rehearsals to engage in purposefully selected and carefully sequenced vocal exercises designed to teach and foster singing habits that are age and genre-appropriate. As a private voice teacher and pedagogist working primarily with choral singers wishing to increase their enjoyment and skill, I value the importance of having a systematic, science-based approach to VWU so that their use can be effective in supporting the singing habilitation of the individuals as well as benefiting the musical articulation, expression, and intonation of the ensemble (Jordan, McArthur and Price, 2018; Hurley and Atkins, 2022). As I prepare to rehearse my ensembles and as I prepare to work with students in my private studio, I always carefully structure my VWU to reflect the pedagogical principles I have studied and written about (Kovacs, 2022).

The task of planning VWU is often misunderstood by choral directors and even some voice teachers and creating a systemic approach with ease when planning time can be challenging. Where McCarther (2023) and others suggest a sequential problem-solving approach to planning VWU, choral directors, teachers, and singers may lack the pedagogical knowledge to complete this task easily. Furthermore, identifying a science-informed method that fits the needs of the ensemble or student requires an understanding of the multiple systematic approaches that have emerged in the last fifty years (Hoch and Sandage, 2018). Often, choral musicians rely on a "what I learned from my teacher" lineage of practice approach, where they repeat what their choral director did when they were in school, which, in turn, was informed by their director, and so on. While there may be valid and appropriate approaches promoted this way, there is often a knock-on effect of misremembered, misquoted, or misunderstood material

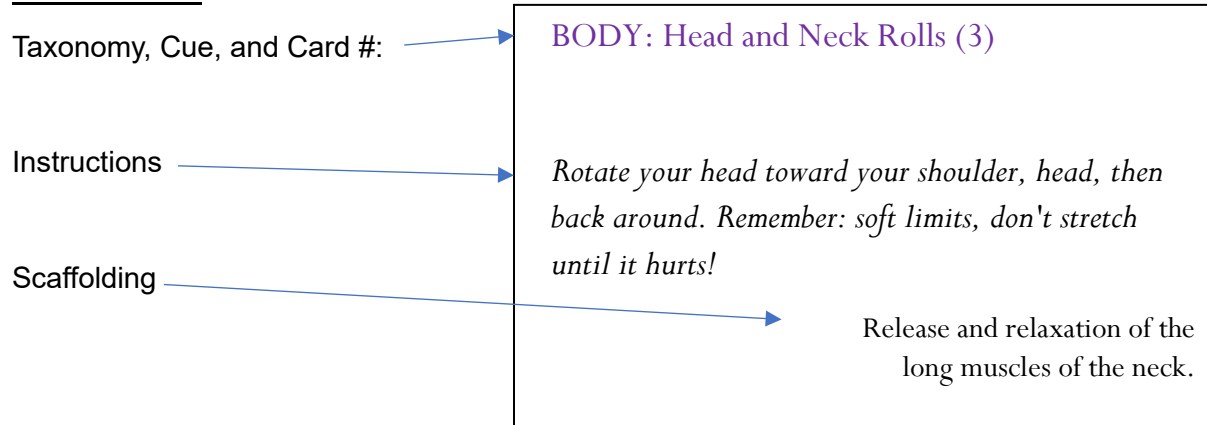
that gets added to, deleted from, and frequently does not have the benefit of the director or teacher's understanding of the pedagogical impact of the exercise (McCarther, 2023). Owing to this lack of consistency and understanding amongst choral singers and directors regarding best practices in voice pedagogy in teaching and acquiring vocal skills in the choral milieu, there is a need for a tool or tool kit that assists choral musicians in designing practical, theoretically appropriate, and consistent vocal warm-ups. Therefore, I chose to investigate how I might contribute to a systemic, science and evidence-based approach to planning VWU using cards that reduce the undesirable or potentially harmful effects of poorly designed vocal exercises and assist choral musicians in creating a plan for effective vocal warm-ups with ease (McCarther, 2023). This investigation and subsequent design project resulted in the development of the Vocal Warm-Up Card Deck.

Figure 1: Prototype Card Design (actual size)

Card Front:



Card Reverse:



Planned Program of Study:

Systematic approaches to voice pedagogy have existed since the 19th century and significantly added to and improved upon with the rise of the application of vocal acoustics, physics, and physiology, beginning with the writing of Richard Miller and Willaim Vennard (Hoch and Sandage, 2018). Vocologists (voice scientists), voice teachers, and choral leaders have all contributed to the practical taxonomies and hierarchies of voice pedagogy by examining "why we do what we do" as teachers of voice and then advocating for approaches that are informed by both science and experience including *know-that* knowledge, or academic and theoretical knowledge that informs practice, and *know-how* knowledge, or tacit, procedural knowledge, which includes skills and techniques (Nelson, 2022). A more detailed description of how Nelson's model is used to support this project is detailed in the Methods section below (p. 10). Through continuing critical examination (*know-what*) of current practice, we can propose ways to promote singers' functional, artistic, and aesthetic education. Having proposed such a taxonomy and hierarchy in my 2022 paper, *Voice Pedagogy and the Choral Singer* (Kovacs, 2022), I plan to examine the literature to investigate further how these pedagogical approaches apply to VWU.

In addition to deepening my understanding of pedagogical approaches concerning VWU, I am tasked with acquiring an understanding of the use of cards (gaming, playing, cue, educational) and how I might approach designing the prototype for my proposed deck of warm-up cards. In addition, I would like to determine if game theory or game design might play a part in how I structure the use of the deck and whether "gamifying" VWU would benefit studio instruction or choral rehearsal. Since I am unfamiliar with some of the more popular collectible card games, I purchased two decks to help further my understanding, including Magic the Gathering and Pokémon. I have included in my project classic game cards, including UNO (Mattel, 2024), traditional playing cards, and educational cards such as Critical Thinking Cards and Logical Fallacies Cards (Thinking Shop, 2022), as potential models for my deck. I also included a search of the literature for information about their history, design, and rules of play and the theory behind their design and use (Turkay, Adinolf, and Tirthali, 2012; Altice, 2013).

In the span of my personal practice, I have observed the benefits of having a pedagogical approach grounded in best practices and current scientific understanding, demonstrated through qualitative and quantitative research. In selecting best practices for both

pedagogical and card design strategies, I identified five achievable goals that could be triangulated in the available literature, including multiple sources, methods, and methodologies (Costley, Elliot, and Gibbs, 2010).

Pedagogical strategies:

- Use a systematic approach that can be easily recalled by the teacher or conductor and incorporated into the learning or rehearsal environment (McKinney, 1982; Miller, 1996b; Ragan, 2020; McCarther, 2023).
- Understand and be able to explain the significance and effect of exercises included in the card deck (Hoch and Sandage, 2018).
- Evaluate the importance and integration of environmental, gender, age, and voice type in the design and function of the card deck (Vintturi et al., 2001; Ragsdale et al., 2022).
- Know about the effect of the sequencing of VWU (Hurley and Atkins, 2022).
- Consider sub-types of VWU, such as Semi-Occluded Vocal Tract Exercises (SOVTE), and address their use in the deck (Gish et al., 2012).

Card deck design strategies:

- Human-centered design considerations such as legibility (Roy and Warren, 2019).
- Consider how informational domains can be incorporated into the card design (Roy and Warren, 2019)
- Understanding the functional and theoretical differences between Collectible Gaming Cards, Educational Game Cards, and others (Silva Vieira, Rocha Tavares, and Chaimowicz, 2023).
- Consider how learning theory interacts with card game systems (Jones and Alinier, 2015).
- Identify methodologies for designing a card game system (Kuosa, 2016).

These strategies and best practices resulted in a deck of cards approximately the size of playing cards (2.5" x 3") and comprising five suits within the habilitative pedagogical domain I established in previous projects (Kovacs, 2022). One side will include the "suit," comprising five categories of taxonomic subjects (body, breath, phonation, range/registration, and intonation) along with a cue name and subcategory. The obverse side will contain instructions on how to execute the warm-up and "scaffold" information about the warm-up to help explain its use within

the function of the VWU. These cues are drawn from principles identified in both Collectible Card Game (CCG) and Educational Card Game (ECD) design and methodology (Samuli Kuosa, 2016; Farashahian, 2018). There are fifty-two cards, including ten each for the five suits and two "wild cards" that call upon the user to improvise their own warm-up or modify one of the other cards based on the pedagogical framework of the card deck. The choice of imitating a pack of traditional playing cards in number (and, as shown later, in size) draws on card design principles discussed by Altice (2013) and (Eaton, 2014). The deck I propose in some ways "gamifies" (adding game-like elements to encourage participation) VWU, including drafting cards and then playing them: the director, teacher, or student "drafts" or picks ten cards, two from each suit, and then works through them systematically (body, breath, phonation, range, intonation). Each exercise is designed to take one to two minutes, creating a warm-up time of ten to twenty minutes, which is considered optimal for effective warm-up (Ragsdale et al., 2022).

This program of study is directed by Learning Outcomes organized into Aims and Objectives, which have been arranged into a timetable (see Figure 2, below) and a more complex Gantt Chart to schedule time, resources, and design work (see Appendix B, p. 58).

Learning Outcomes:

- To better understand the way tools can be used to support pedagogical practice.
- To better understand the process of researching, designing, and using supportive tools that apply to pedagogical practice.
- To better understand how singers, teachers, and conductors can use VWU in a way that clarifies and teaches the principles of voice pedagogy in the choral milieu.

Aims:

- To learn how supportive tools like educational cue cards can assist in making the selection of VWU more effective and efficient.
- To learn about the pedagogical history, science, and taxonomy of VWU as they apply to studio and choral rehearsal practice.
- To learn about the history, Theory, and practice of card design, including gaming, educational, and other types of card decks to discover what elements might be important to the overall design of the proposed card deck.
- To identify frameworks, guidelines, and design principles that would assist in creating a deck of cards for use in selecting and applying VWU in studio and rehearsal practice.

Objectives:

- Identify relevant literature (both peer-reviewed and grey) for WVU and card deck systems (gaming, educational, and other) and identify potential themes, codes, and categories that would inform designing a warm-up card deck.
- Create an inclusion matrix and critical review (short analysis) of the literature to help underpin the design and content of the proposed card deck.
- Develop lists, gather personal studio and rehearsal notes, and gather other documentation for WVU that is already in use or being observed in practice elsewhere.
- Create a matrix of WVU that includes a name, description, and relevant pedagogical information (scaffolding) to begin building the content for the proposed card deck.
- Create a prototype card deck using the best practices, frameworks, and guidelines identified in the literature search.
- Using reflective practices identified by Kolb and Nelson, engage in reflective analysis of both the program of study and the creation of the artefact, in this case, the proposed card deck (Kolb, 2015; Nelson, 2022).

Task & Time, Resources, Methods, and Criteria

This project is expected to take from mid-June to mid-October (see timeline below) and will comprise four components, including Methods Research and Project Design (the entire length of the project, with the prototype card deck appearing near the end of September), Literature Selection and Analysis (from July to September), Portfolio (September) and Project Evaluation (October). Due to some scheduled personal travel, a large part of August is not available for active research, writing, or experimentation, so all of the activities for this project have been scheduled with that month's absence from the project in mind. In addition to the resources necessary to complete the literature search for this process, I anticipate integrating additional graphic design tools (and the skills to use them) into this project based on my review of some commercially available products. As a non-profit executive in other parts of my work life, I have access to Adobe InDesign and other Adobe design products and a basic skillset in their use. I imagine that the prototype or later drafts of the card deck will need a more sophisticated approach to create the layout of the cards (Samuli Kuosa, 2016; Farashahian, 2018). Colored pens, markers, poster paper, drafting paper, and other simple tools will also be needed to create draft designs for the cards. Finally, acquiring physical card decks of multiple

kinds (Collectible Gaming Cards, Playing Cards, Game Cards, Educational Cards) and learning about how they are used will be a part of the research phase (Farashahian, 2018; Haraldseid-Driftland et al., 2024).

The literature search will be assessed through an inclusion matrix (see Appendix C, p. 59) comprising the publication details, class by type (peer-reviewed or grey) and tier (number of citations, impact, or author reputation), evaluation of relevance to the research question, and codes to determine what part of this study the literature applies to (Scott, 2022; Winter, 2023). Card design and Theory, pedagogy, and learning theory are the three major codes I have externally derived based on my early scan and survey of the literature informed by prior knowledge and experience (Noyes et al., 2021).

Figure 2: Literature Inclusion Criteria

<u>Information</u>	Title	Text	<i>Title of paper</i>
	Author	Name	<i>Author (s) of paper</i>
	Year	Date	<i>Year Written</i>
	Abstract	Y/N	<i>Has the abstract been read?</i>
	Selected?	Y/N	<i>Has this literature been selected for use?</i>
	Scanned?	Y/N	<i>Has this document been scanned into Mendeley?</i>
	Coded?	Y/N	<i>Has this document been coded?</i>
<u>Type/Tier</u>	Type	P/G	<i>Peer or Grey literature type?</i>
	Tier	1,2,3	<i>Literature tier: 1 = most rigor/impact 3 = least</i>
<u>Relevance</u>	Reas?	Y/N	<i>Does this literature answer the research question?</i>
	P:	Y/N	<i>Practice relative to the R? are addressed.</i>
	T:	Y/N	<i>Theories related to the R? are addressed.</i>
	M:	Y/N	<i>Methods related to the R? are addressed.</i>

To deepen my understanding and recall of the literature as it applies to this project through a hermeneutic process, I will also use a critical reflection diary inspired by the work of Cotrell (2023), Bolton, and Delderfield (2014), and as advocated for by Winter (2023).

Figure 3: Literature Reflection Diary

Title	Author	Context	Initial reaction to content	Reflection and Analysis: perspectives, intersections, and biases

The reflective review that follows this section is based on Kolb's Theory of Learning, which is expressed through a cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 2015). Kolb's Theory suggests four different styles of learning:

- **Diverging:** characterized by innovation, adaptation, and imaginative approaches to problem-solving.
- **Assimilating:** characterized by inductive thinking that synthesizes a number of theories or ideas as a whole.
- **Converging:** characterized by the practical application of ideas to solving technical problems.
- **Accommodating:** characterized by an intuitive "trial and error" approach.

I plan to complete a reflective journal based on this model contemporaneously with this project's Research & Design and Literature Selection & Analysis portion (Appendix D, p. 60). If time allows, the entries into the reflective journal will be coded to reflect the Kolb learning type being engaged (D: Diverging, A: Assimilating, C: Converging, A: Accommodating).

In support of the Project Evaluation section of this project, I will be analyzing the experience using Nelson's taxonomy of "Know That, Know How, and Know What." This systemic evaluation tool is associated with the concept of "practice as research" in the arts. It assists in critically reflecting on artefacts, performances, and arts practice by categorizing and examining the knowledge used in creating them (Nelson, 2022). These categories include propositional knowledge (Know That), procedural knowledge (Know How), and reflexive knowledge (Know What.) Nelson's taxonomy will be discussed in further detail in the second section of this paper, where I will include a discussion of the relevant literature supporting the creation of the card deck (Know That), the methods used in designing, creating, and composing the card deck prototype (Know How), and a critical discussion of the knowledge (warm-up examples, scaffolding, and taxonomy) contained in the card deck (Know What).

Figure 4: Project Timetable

	Start	End	June	July	August	Sept.	Oct
Research & Design							
Methods Coursework	6/19/24	7/31/24					
Project Outline and Design	7/27/24	8/1/24					
Resourcing the project	8/1/24	9/15/24					
Rough Design of Artefact	7/31/24	9/15/24					
Final Draft of Artefact	9/15/24	10/5/24					
Literature Selection & Analysis							
Scope and Criteria	7/27/24	8/15/24					
Initial Review	8/19/24	8/30/24					
Read and Reflect	9/1/24	9/15/24					
Critical Evaluation	9/15/24	9/30/24					
Portfolio							
Introduction	9/1/24	9/5/24					
Program of Study	9/5/24	9/15/24					
Critical Review	9/15/24	9/30/24					
Project Evaluation							
Introduction	10/1/24	10/5/24					
Review: Know How	10/1/24	10/10/24					
Review: Know That	10/5/24	10/15/24					
Review: Know What	10/5/24	10/15/24					
Conclusion:	10/12/24	10/15/24					

Critical Review of the Learning Process:

This review aims to demonstrate an awareness of and critically examine the concepts identified in the Program of Study and desired learning in preparation for the artefact design. Using the Kolb Reflective Model (Kolb, 2015), I will describe the experiences, observations, conceptualizations, and experimentation that took place during the Research & Design and Literature Selection & Analysis portion of this project, noting that this work happened concurrently, so there are overlapping reflections with respect to the former and latter phases. The benefits of reflective practice in workplace-based research are well documented in the literature, including the work of Cottrell (2023), Bolton and Deledorfield (2014), and others. Kolb's Reflective Model has the benefit of contemporaneously examining the experience of

learning while simultaneously encouraging spontaneous experimentation (including adaptation and adjustment), which is also encouraged in research philosophy by Le Cunff (2022), who placed this kind of dynamic, reflective practice squarely in the frame of hermeneutic methodology.

Figure 5: Kolb Reflective Model

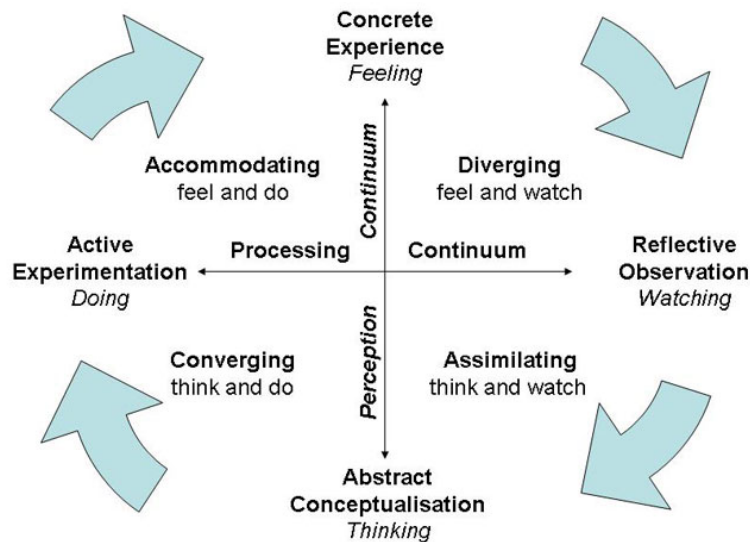


Image: Structural Learning (2024)

In my research practice, I use an Excel workbook for my diaries, journals, project data, timetables, and other pertinent project information. One of the benefits of this method is that it allows me to easily code my research across multiple areas of analysis using colors, letters, and numbers and enables me to efficiently analyze my data across the segments of my research design, adding to my ability to triangulate, synthesize, and narrate the data (Boell and Cecez-Kecmanovic, 2010; Winter, 2023). However, in the case of the Kolb Reflective Journal (Appendix E, p. 80), I could visualize the cyclical, sequential nature of the process on one page. As I completed one "concrete experience" entry and journaled through "active experimentation" on the spreadsheet, I observed the natural flow of the Kolb Reflective Cycle as an active hermeneutic matrix as the last entry on the line (active experimentation) informed, changed, or improved the concrete experience beginning the following line. For example, in Figure 6 below, as I wrote about selecting literature about playing cards, I noted some possible codes

associated with the literature, referenced in sequence at the beginning of the following line. This "chaining" happened with enough frequency to confirm the validity of the reflective practice in examining my learning experience (Kolb, 2015).

Figure 6: Kolb Journal Example

Experience	Reflection	Abstraction	Active Experimentation
<i>I completed the literature search for information about playing cards.</i>	<i>Since I have no research knowledge about this subject, I need to consider multiple kinds of cards, not just gaming cards. What about using index cards in a learning environment for study? What about Digital Gaming Cards?</i>	<i>The existing peer-reviewed literature falls roughly into three categories: gaming, educational tools, and process facilitation.</i>	<i>I think the next steps here after running them through the inclusion matrix is to create a set of codes for this group of references. I can already see three major codes and several subcodes.</i>
<i>Completed reading & coding the playing card source information</i>	<i>This is a complex topic with multiple complex philosophical design solutions driven primarily by the function of the card.</i>	<i>Each category of card has a design history reflected in its use, with several key overlaps (card size, orientation, suits) and several divergent qualities (expansion packs, change of story/action)</i>	<i>I will need to create the first draft prototype (based on advice in one of the papers) and play around with it fairly soon. Color, typeface, iconography, and instructions (scaffolding) will need to be detailed and then refined into a second draft/prototype.</i>

In the paragraphs that follow, I will critically examine the components of this project completed with respect to the Portfolio and follow the hermeneutic flow of the Kolb Reflective Cycle for each component: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

1. Project Design

This project began by creating a writing outline with budgeted word counts for each section, a project workbook for data collection, and a timeline and Gantt chart with major components from the outline. I always find this task vital to my ability to pace my resources and identify any potential crunch points, which in this case included a three-week trip abroad during what would otherwise be the research phase. As I stepped back and looked at the visual record I created, I was also aware that there were some critical intersections at the beginning of October, where my work and professional commitments will make scheduling my writing time

intentionally an essential part of my success. Knowing my departure was on August 1st, I reviewed and highlighted my class notes from the methods coursework for key points that need to be amplified or further researched on my return. I also created a project workbook that included spreadsheets for the tools I felt would be needed for this project, including the Gantt Chart, Daily Journal, Active Task List, Inclusion Matrix (template), Critical Reflection Diary (literature review), Kolb Journal, a list of potential codes, and a Nelson Journal workbook. Ultimately, I decided not to use the Nelson Journal Workbook, as it required a level of detail out of scale with the time available for this project.

2. Prototype Pre-design

I placed five sheets of paper in my hallway, one each for the pedagogical domains I planned to use (my externally derived criteria) as the primary suits for the warm-up cards, including body, breath, phonation, registration, and intonation. I then considered various warm-ups, writing them down as I walked past them. One important realization was that the term "registration" as a technical pedagogical term may not have the legibility I would like it to have, so I decided to change the title of that suit to "range."

3. Literature Search and Analysis: Collectible, Educational, and Traditional Playing Cards

With little or no personal knowledge of the Theory, design, or history of card decks, I began my literature search with terms like "playing cards" and "gaming cards," soon expanding my search terms and the informational domains (from gaming websites to peer-reviewed literature) I was exploring. Because of my limited understanding of the subject, I felt I could be more objective in my search and selection process, insomuch as I was not seeking out my preferences in card type or game (such as Uno or Magic the Gathering). The literature search did reveal that there were many more types of cards and that there was indeed a virtual world for such artifacts; however, as I am interested in creating a physical artifact, I left much of that domain behind in favor of literature that supported the use, play, or integration of physical cards.

Educational gaming cards receive very specific treatment in the literature: the psychology of learning reinforcement (Silva Vieira, Rocha Tavares, and Chaimowicz, 2023). Within this literature group, attention is also given to the importance of learning theory and cultural influences in card design and use as well as how reflective practice can be integrated into play (Haraldseid-Driftland et al., 2024).

The learning that resulted from analyzing this literature pointed to the idea that a simple approach based on color, readability, and understandability would be my best practice, leading me to experiment with some draft card designs. In an act of "digital fingerpainting," I used MS Word to create three sequential drafts, organizing the principles drawn from this initial literature search and analysis (see Figures 7 -9 below).

Figure 7: Card Design Draft 1

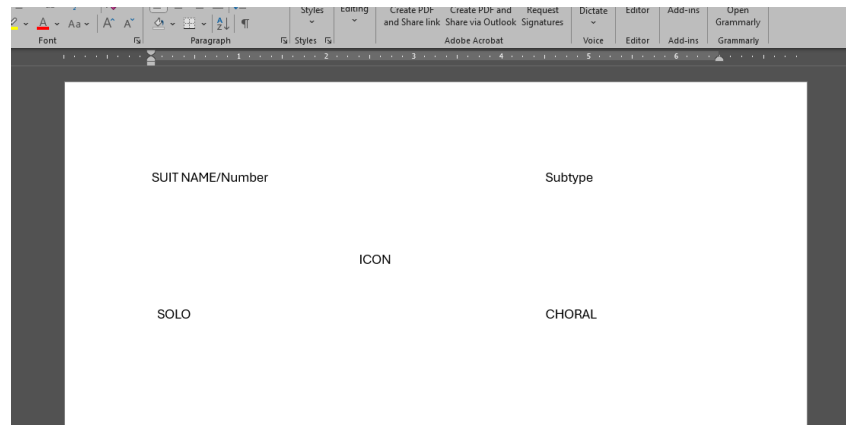


Figure 8: Card Design Draft 2

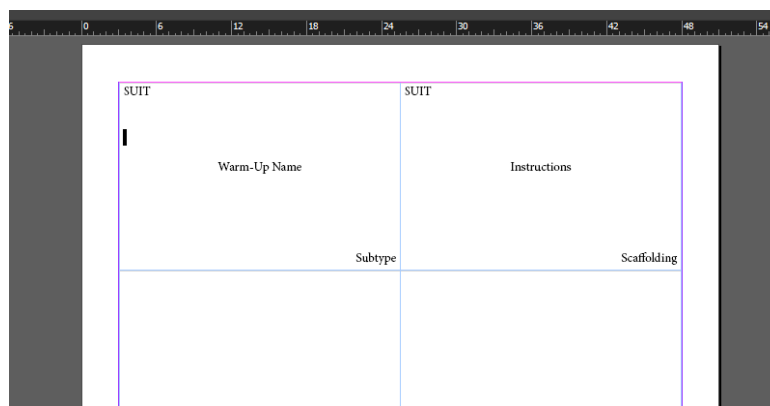


Figure 9: Card Design Draft 3 (prototype format)

SUIT	SUIT: Name
Name of Warm Up	Instructions
Subcategory	Scaffolding
SUIT	SUIT: Name
Name of Warm Up	Instructions

4. Literature Search and Analysis: Vocal Warm-Ups

VWU have been written about extensively, and formal methodologies for using them were outlined as early as the nineteenth century (McCarther, 2023). As I prepared my search criteria for this research segment, I took into consideration that VWU would be recognized in both the choral and solo vocal literature and that my attention would need to focus on *functional* rather than *musical* warm-ups; that is, VWU intended for the habilitation and exercise of the voice, not for developing precision or expression within the music being rehearsed (Elliot, Sundberg and Gramming, 1995; McHenry, Johnson and Foshea, 2009). As with past literature searches, I found that, in particular, the professional choral journals, including *The Choral Journal* of the American Choral Director's Association and the *International Journal of Choral Singing*, are poorly indexed and require extensive manual searching, often going through each issue one at a time looking for relevant articles, which was confirmed by Google Scholar and Elsevier returning few hits for these journals. Elsevier, Google Scholar, and JSTOR revealed material both related and adjacent to the research question, including the intersection of VWU with other voice professionals such as Speech Language Pathologists, providing additional perspective and possible audience for the VWU Cards (Manjunatha, Nayak, and Bhat, 2022).

As I identified the grey literature to include in my literature search and review, one emerging theme was that many 20th and 21st-century pedagogists agree on VWU principles and how their methodologies, hierarchies, and taxonomies vary. I will address those variances in the second part of this paper by comparing the taxonomies and showing where they overlap or

concur (Nelson, 2022; McCarther, 2023). The second emergent theme arising in the peer-reviewed literature was the application of learning theory, in particular motor learning theory, sequencing, and perception as a vital consideration in designing VWU (Gish et al., 2012; Moorcroft and Kenny, 2013; Hurley and Atkins, 2022). As there was similar consideration given to how these theories and practices intersect with gaming and educational card systems, I was able to identify a natural overlap in the design strategy of the Vocal Warm-Up Cards (Turkay, Adinolf, and Tirthali, 2012; Silva Vieira, Rocha Tavares and Chaimowicz, 2023). I could not find any peer-reviewed literature that critically examined musical education cards, which I certainly recall using as a student and as a teacher to memorize pitches and rhythmic notation, some of which I constructed myself on 5 x7 cards.

As I completed my critical reading and reflection of the literature for this segment (Appendix D, p. 60), I began to merge the elements of card design with the hierarchical and taxonomic elements of VWU, including subcategories, instructions, educational scaffolding (explaining the "why" of the VWU) by creating a spreadsheet of VWU categorized by my externally derived taxonomy of Body, Breath, Phonation, Range, and Intonation, leading me to begin creating the first prototype card deck.

5. Creating the Prototype

With the analysis of the literature complete and the matrix of VWU examples with taxonomies designed, I moved ahead with populating the VWU example matrix with the information needed to create 52 cards, the number of cards in a traditional playing deck (Eaton, 2014). I decided on this format because I learned through the literature analysis that it was feasible to have a deck of 52 cards printed "on demand" as one does with a self-published book (United States Playing Card Company, 2024). Immediately, I became aware of the magnitude of work I was presented with. The amount of detail I chose to include would mean carefully edited, short instructions and scaffolding remarks, and there would be insufficient time for me to engrave musical examples for those VWU that involved the singing of pitch sequences. I wrote descriptive instructions for all 52 cards, knowing that this was just the prototype and that my proof-of-concept would rely on the concrete merging of the concepts identified in the literature (Kordaki, 2015), even if the design elements of the card were not as fully polished as a commercially available product. I would posit, however, that a chief outcome here is not just the artefact prototype, but the adoption of a methodological approach for designing an artefact, and the concepts, theories, and practices encountered during the learning process.

I considered two methods for generating the prototype: design software and a mail merge from the design matrix to printable card stock; however, both methods proved unworkable. The first failed to be efficient enough, as it was taking an excessive amount of time to navigate the intricacies of the design software even with a reasonably simple card format, and the second failed because the formatting I preferred for the card design could not be easily achieved with the merge feature of Microsoft Word; so I settled on a blending of the ideas, using a pre-set template in a grid that I overlayed into a word document, and then cut and paste the data over from the VWU example matrix, formatting and editing each card by hand using the design tools in Microsoft Word to ensure legibility and consistency as much as possible. Even with this blended method, the task proved to be time-consuming and not wholly successful, as the layout of several cards needed so much adjusting that they were inconsistent visually with others in the deck. From this, I learned that I would need to consider a larger format for better legibility in the next prototype. Several other considerations for the next version emerged during the construction of this prototype:

- Having a small QR code in the corner of each card linked to a video of the example being performed might be one way to enhance the VWU Cards.
- Having an icon or picture cue on the front of the card will help the user visually identify the card quickly.
- Consider color schemes that promote visual accessibility.
- Include engraved musical examples.
- Re-edit the instructions replacing "terms of art" or pedagogical jargon that the scaffolding may not easily explain.
- Develop a consistent nomenclature for phonetic syllables used in the VWU that is not dependent on the International Phonetic Alphabet, a tool used primarily by voice professionals (Welch, Howard, and Nix, 2019).
- Expansion decks (Turkay, Adinolf, and Tirthali, 2012) that add to and extend the current deck. This idea occurs in both gaming and educational card decks (Samuli Kuosa, 2016; Farashahian, 2018).

One regret I suspected as I completed the prototype is that I would not have an opportunity to test the card deck "in the wild" by integrating it into my studio practice and choral rehearsals. I'd even been approached by a colleague interested in trying them with their choral ensemble; however, this will be for a later time in this project's life cycle. As I reflect on the artefact, I have some affirmative and constructive thoughts:

- The categories are easy to understand and consistent with my practice.
- Having scaffolding helps people understand why they are doing what they are doing.
- The instructions provide a good cue for exercises already learned; however, newer or unfamiliar ones require demonstration or teaching.
- Also unclear in the current design is the hierarchical sequencing of the VWU: unless the student or ensemble knows my preference for the sequence of Body, Breath, Phonation, Range, and Intonation on the card, there are no indicators on the card in what order to use them. While this is included in the instructions, it might be helpful to have a cue about this somewhere on the card itself.

I hope to revisit the Vocal Warm-Up Cards after this project is concluded to improve them enough to become a commercially viable product, most likely self-published. This would include working with design professionals, testing with teachers, students, and conductors, and ensuring I have any necessary permission for copyrighted material included in the examples.

Word count this section: 4,780

PROJECT EVALUATION

Introduction

Vocal warm-ups (VWU) have been integral to singing habilitation, practice, and performance and have been discussed in pedagogical literature since the 19th century. (Hoch and Sandage, 2018). Generally, two kinds of VWU are recognized in the literature: the first broadly includes the mechanics of vocal function, and the second for the practice and improvement of musical expression (Hurley and Atkins, 2022; McCarther, 2023). Since VWU used in support of musical expression are often drawn from the repertoire of the singer or choral ensemble (and not predictable for this project), I am focusing on VWU specifically for the development of singing vocal function. The use of VWU is encountered in the voice studio, choral rehearsal, and student practice (Gish et al., 2012; Grady and Cook-Cunningham, 2020) and, in some cases, may include a Vocal Cool Down (VCD), although there is little or no evidence of the benefit of VCD supported in the literature beyond a handful of perceptive studies (Onofre et al., 2017). The benefits of VWU, however, are discussed in the literature and include acoustic, physiological, and psychological benefits (Gish et al., 2012; Kirsh et al., 2013; Moorcroft and Kenny, 2013).

Even with the benefits of VWU well documented in both the peer-reviewed and grey literature, there is still some ambiguity and lack of understanding about the pedagogical aspects of VWU, particularly among choral directors, some of whom may refer to warm-up practices they adopted from their teachers (Titze, 2000; Hurley and Atkins, 2022; McCarther, 2023). This gap in understanding can impact choral musicians in several ways, including inefficient, inappropriate or harmful techniques being adopted by the singer (Bozeman and Ragan, 2021; McCarther, 2023). To address these concerns, this study seeks to develop Cards that offer consistent structure in an accessible, research-backed way.

As systematic approaches to voice pedagogy take on a more science-informed or evidence-based approach, as demonstrated by the work of Ragan and McCoy, among others (McCoy, 2012b; McCoy and Ragan, 2018; Ragan, 2020), providing a systemic way for choral directors to approach VWU has appeared with greater frequency in the literature (Smith and Sataloff, 2013; Howard, 2015; Grady and Cook-Cunningham, 2020; McCarther, 2023). The ever-increasing focus on voice pedagogy in the choral milieu is something I value as a voice teacher, choral conductor, and singing voice specialist working primarily with choral singers, and have written about in the past with *Voice Pedagogy and the Choral Singer* (Kovacs, 2022), wherein I

describe a pedagogical meta frame that includes three domains: singer health, tonal considerations, and voice habilitation.

This project synthesizes a systematic approach to voice pedagogy by creating an accessible, easy-to-use tool that promotes a practical and evidence-based approach to warm-up design for singers, teachers, and choral directors. It extends the habilitative domain I have written about into a hierarchical taxonomy (a methodology preferred by many pedagogists and voice scientists into that of Body, Breath, Phonation, Range, and Intonation, each of which is included in the design of the Vocal Warm-Up Cards resulting from this project (Kovacs, 2024). It does this by visually organizing the pedagogical concepts and exercises. The Vocal Warm-Up Cards (prototype shown in Appendix A, p.39) are designed to be used to create effective, appropriately sequenced, applicable warm-ups in the voice studio, choral rehearsal, or at home by a student. There are enough cards in each category to help create variety in practice, avoiding boredom or repeating an exercise to the point of ineffectiveness (Jones and Alinier, 2015; Roy and Warren, 2019). Care was taken into the visual design such that the elements of identification, instruction, explanation, and easy-to-remember cues are consistent and apparent to the user (Farashahian, 2018; Haraldseid-Driftland et al., 2024).

The potential impact of this artefact is that it can provide straightforward, effective, and pedagogically sound vocal warm-up exercises for the user across multiple environments and not just for choral musicians. I hope that by integrating some of the best practices for both VWU and card design elements, the tool is easy enough and fun enough to transform a sometimes frustrating chore into an enjoyable learning experience that prepares, improves, and focuses vocalists for the task of singing. What follows this introduction is a critical examination of the knowledge used in creating the Vocal Warm-Up Cards and will be expressed through Nelson's research principles for practice as research in the arts, taxonomically organized into three types (Nelson, 2022):

- **Know-That:** Includes propositional knowledge that informs practice, including theories concepts, and methodologies. In this paper, know-that will be elucidated as a literature review.
- **Know-How:** Includes procedural knowledge acquired through practice. This paper examines know-how through personal practice notes and discusses how lineage of practice (inherited knowledge) shows up in my work, sometimes as a bias.

- **Know-What:** Includes reflexive knowledge, including insights about the process and the outcomes. This paper will examine the artefact's effectiveness in communicating the theories, concepts, and methodologies intended in its creation and use.

Review: Know-That

In support of the credibility of the Vocal Warm Up Deck as reflecting best practices, methodologies, and concepts, a literature search and analysis was conducted which included research of voice pedagogy as it applies to VWU as well as those for card design and applicable theory. I constructed an inclusion matrix (Appendix C, p.59) to assist in the selection of literature under consideration, and I kept a critical reflection log (Appendix D, p. 60) for the selected literature (Scott, 2022; Winter, 2023). I included peer-reviewed and grey literature in the search, which yielded several codes and subcategories of subject material for consideration in the inclusion matrix (Walliman, 2001; Costley, Elliot, and Gibbs, 2010). To look at the literature for both the vocal pedagogy and card domains holistically, I derived three primary codes for inclusion that appeared across the literature identified in my search: Theories, Methods, and Practices. While reviewing the card domain, it became apparent that there would be a larger group of card *kinds*: educational cards, cue cards, gaming cards, collectible gaming cards, and computer gaming cards; however, to acquire the knowledge needed for this project, those were critically examined through the lens of history, design, Theory of Play or use, and development (Kordaki and Gousiou, 2017).

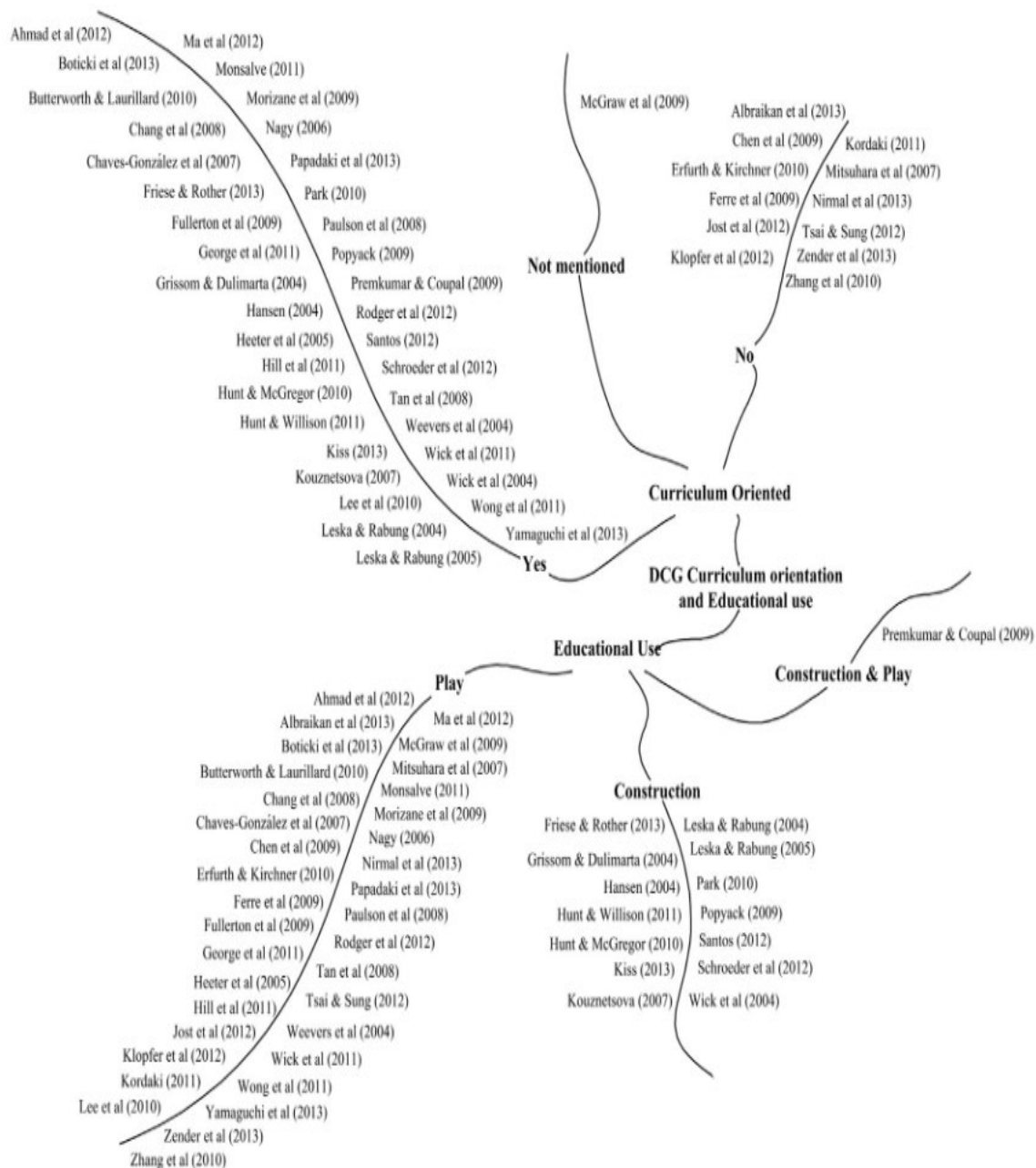
Know-That: Card Design

Because I lacked much procedural knowledge about gaming or educational card systems, I began my literature search there, bolstered with the purchase of several different kinds of card decks: traditional playing cards (Bicycle Playing Cards), multiplayer game cards (Uno), and educational card decks (Creative Thinking Cards), which assisted me in visualizing and practicing some of the concepts described in the literature (School of Thought, 2022; Mattel, 2024; United States Playing Card Company, 2024). One of the key tools in helping me organize my critical examination of the literature about card design and use was a series of visual maps included in Kordaki and Gousiou's systemic review of educational card games (2017), an example of which appears in Figure 10 below. While these maps are designed to elucidate the historical progress of research and implementation of educational card games,

they also outline the concepts underpinning their design, practice, and assessment. By examining the concept threads in their systemic review, I could critically consider the effects of my decisions about design, methodology, and use (Theory of Play) might be structured.

Figure 10: Kordaki & Gousiou's learning tool map

M. Kordaki, A. Gousiou / Computers & Education 109 (2017) 122–161



For the purposes of this review, I would like to summarize my findings with respect to game cards into three broad categories: card use and mode of play, principles of graphic design, and card design methodologies as they apply to the warm-up cards:

Mode of Play (Theory):

In most card games, there is an "opponent," and the relationship to the opponent is often determined by the number of players (Altice, 2013). Modes ranging from single-player to multiplayer and large scale (arena play) contribute to the complexity of opponent relationship and game strategy required of the players (Silva Vieira, Rocha Tavares and Chaimowicz, 2023); however, there was less emphasis on the opponent or "battle" basis for play in educational card games with greater focus on the social and motivational benefits (Turkay, Adinolf and Tirthali, 2012). Also emphasized in the literature was the importance of considering the ecology of the use environment to the mode of play, including the physical and social environment in which the cards will be used (Vintturi et al., 2001; Jones and Alinier, 2015; Samuli Kuosa, 2016). From this grouping of the literature, I learned that the Vocal Warm-Up Cards should be able to engage multiple modes of play: single-player/student, two-player/teacher-student, and multiplayer or arena: conductor/choir. I also derived from this reading that the overarching achievement is not defeating your opponent but promoting knowledge, skill, and understanding through play (Chapman and Morris, 2023).

Design Methodology:

Kuosa (2016) and Altice (2013) both examine multiple methodologies and systematic frameworks for creating collectible card games, while Kordaki (2015) focuses on the importance of having a constructivist methodology in designing educational card games; all emphasize the idea that active participation in engaging with the content is the key to constructing the experience gained through game play. At least two studies included in my research also emphasized the inclusion of a reflective process in the methodology of card design and, in one case, into the "mode of play" for the cards (Jones and Alinier, 2015; Haraldseid-Driftland et al., 2024). My goal in surveying these papers was to arrive at a synthesis of ideas to apply to this project as a process for designing the Vocal Warm-Up Cards (these are alluded to above in the Aims and Objectives section of Part 1:

- 1) Create a "good design qualities" matrix for the Vocal Warm-Up Cards.
- 2) Create a prototype that can be field tested.
- 3) Add elements and corrections to the design based on feedback.

As I will discuss in the conclusion of the next section, none of these things happened in practice; however, having an awareness of them and the knowledge that informed the design of that process permitted me to be spontaneous and also revealed the time cost involved in such a high level of detail for a project of this size and scope.

Graphic Design (Practice):

Card design and content are intrinsically linked, and the way the content is organized should contribute to the design of the card (Farashahian, 2018; Roy and Warren, 2019; Haraldseid-Driftland et al., 2024). This means that for this project, the content must be organized with a high degree of coherence and consistency so that the elements of the card faces can be placed into a visual framework (Lyons et al., 2024). There are some generally accepted principles and best practices for the graphic design of cards found across the literature surveyed for this project, which can best be grouped as (Roy and Warren, 2019):

- **Systematic Design:** There is coherence to the graphic elements that express the importance, hierarchy, and function of what is displayed and are ontologically consistent (Farashahian, 2018).
- **Human-Centered Design:** the cards are easy to use, hold, and read, and are legible (the contents are understandable) to the user (Vintturi et al., 2001).
- **Domain Specific:** the design reflects the needs of the content, ecology, and environment of use (Haraldseid-Driftland et al., 2024).

Know-That: Vocal Warm-Ups

With more than thirty years of experience as a choral professional, I have extensive propositional and procedural knowledge concerning VWU. I am aware that I need to confirm and expand my understanding, identify any changes or developments in my propositional knowledge, and look to the literature for help identifying any shortcomings or biases in my procedural knowledge. My literature search included both peer-reviewed and grey literature, with the latter focusing on classical vocal and choral pedagogical texts. As with the literature exploring card design, several subcategories emerged as relevant to the artefact, which

includes the physiology, acoustics, and perceptive study of VWU (grouped as Theory), the taxonomy, hierarchy, and methodologies of VWU (grouped as Methods), and examples of VWU for both the choral and solo vocal milieu, including considerations and accommodations for the aging voice and on the gender spectrum (Practice) (Smith and Sataloff, 2012; Sauerland, 2022).

Vocal Warm-Up Theory:

Much of the available literature reviewed and analyzed for this project concerning the theory and science of VWU focused on their effect on sound, particularly on acoustics and the perception of acoustic changes or improvements by the singer or listener. A smaller group focused on the physiological changes that occur to the vocal mechanism resulting from VWU, and an even smaller group suggested different ways of examining VWU for effectiveness across domains other than auditory perception. Within the first group, much attention was given to Semi-Occluded Vocal Tract Exercises (SOVTE), a type of VWU that increases intraoral air pressure during phonation, resulting in a more efficient exchange of aerodynamic energy (breath) to acoustic energy (voice) and is of particular interest to voice scientists and voice professionals for their effectiveness in reducing the risk of injury to singers and assisting in the effective habilitation of healthy technique (Titze, 2006). Several examples of SOVTE are included in the prototype of the Vocal Warm-Up Cards, and in the event an "expansion pack" is created, I would make one such set of cards entirely for SOVTE because of their almost universally appreciated effectiveness and ease of use (Duke et al., 2015; Manternach and Daugherty, 2019; Savareh et al., 2023). Aside from the focus on the effectiveness of SOVTE, the literature concerning VWU and perception specifies that singers and listeners alike perceive improvement in acoustic perception, technical control, and psychological factors relative to singing and that these factors span across style and genre, including choral singers, opera soloists, and singers of contemporary commercial music (Moorcroft and Kenny, 2013; Portillo et al., 2018; Grady and Cook-Cunningham, 2020).

Acoustic measurements and physiological evidence supporting the perceptive reporting of singers and listeners is sparse but growing. With respect to VWU, this growing body of evidence helps to affirm the experiences of Choral Musicians and further validates the broad range of benefits and associated experiences singers have as a result of functional vocal warm-ups. A handful of studies have paired perceptive studies with techniques such as Long-Term Average Spectrum (LTAS) to establish concurring acoustic measures to confirm concurrent

perceptive data (Ragsdale et al., 2022), and others attempt to measure changes in air pressure (glottal airflow) to look for changes in vocal efficiency (Portillo et al., 2018). Additional research considered for this report includes examining VWU from different perspectives, including the environment the warm-ups are taking place in (air-conditioned or heated room, humidity levels) and the position of the singer (seated or standing), establishing that yes, warm-ups are more effective (measured perceptually) when performed standing up (Vintturi et al., 2001). This is a compelling confirmation of the choral director's myth that we "sing better when we stand." Throughout the literature, there is the admission that we have little understanding of the physiological changes to the tissue of the vocal tract during and as a result of VWU; however, there are two threads of discussion in the literature that try to examine this question. The first looks at acoustic and aerodynamic changes to make conclusions about changes to the anatomy, including vocal fold thickness, changes to mucosal flow, and changes to the size of sinuses such as the piriform sinuses (Elliot, Sundberg and Gramming, 1995; Obert et al., 2023). The second thread follows exercise science principles and looks at the effect of stretching muscle, nerve, and cartilaginous tissue, increasing vascular activity, and the changes in oxygen, carbonic acid, hormone, and neurotransmitter levels (Hoch and Sandage, 2018; Moss Erickson, 2022). An example of applying exercise science in VWU is performing vocal slides from one pitch to another.

Vocal Warm Up Methods:

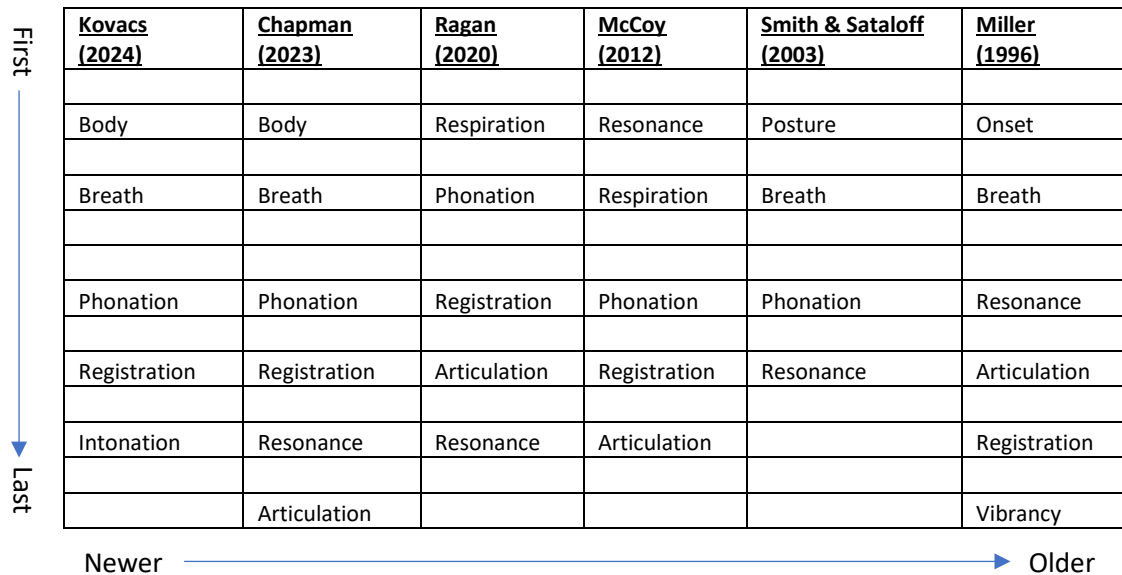
One of the most well-regarded methodologies that has endured in voice studios since the 19th century is called *Bel Canto* (beautiful singing), also associated with the operatic musical style of the time (Reid, 1950). Rather than being associated with a school, it is a style with several schools in which several systematic warm-up methods have emerged, some of which include Marchesi, Mancini, and Tosi (Reid, 1950; Coffin, 1980). Voice pedagogists such as Cornelius Reid, Berton Coffin, Johan Sundberg, and William Vennard took advantage of the current science of their time, expanding our understanding of vocal acoustics, including their research, and extending the work of *Bel Canto* composing new vocalizes (vocal exercises) that included new or changed propositional knowledge, but provided through their authorship a scaffolding for understanding the relationship of the acoustic and physiological aspects of the voice to the practice of vocal exercises (Reid, 1965; Vennard, 1968; Coffin, 1987; Sundberg, 1987). Their research paved the way for pedagogists like Richard Miller, who wrote a seminal 20th-century pedagogical text, *The Structure of Singing: System and Art in Vocal Technique*

(Miller, 1996b). There is also a companion text by Miller, *The Art of Singing*, which focuses less on the systemic aspects of teaching vocal function and more on the musical aspects of vocal production, which demonstrates the division of VWU into two similar groups, vocal habilitation and musical expression (Miller, 1996a). Many authors have followed, each employing the current science of their time or adding to it with their own research and offering systematic methods for teaching singers "how to sing" efficiently and artfully. As I reflect on the idea of lineage of practice, I see that this is the standard or ideal for me, where expert practitioners continue to build on both propositional and procedural knowledge in a methodical, evidence-based way (Winter, 2023).

For this project, I have relied on the research and writing of six pedagogical authors whose work as teachers has had an impact I can observe or experience. This is partly due to the time constraints that prevent me from studying, analyzing, and practicing additional methodologies with which I have little or no experience. As McCarther (2023) noted, voice pedagogists and professionals tend to develop their own hierarchies for teaching vocal technique, and the authors surveyed for this paper are no exception, including this author! While I have critically examined my own pedagogical hierarchy of *Body*, *Breath*, *Phonation*, *Registration (Range)*, and *Intonation* elsewhere (see Kovacs, 2022, 2024), I found it useful to evaluate my choices with respect to these pedagogists and in so doing also discovered where there were similarities and differences in approach, shown in Figure 11 below. Each of these authors has written about systemic, scientific, or evidence-based methods for teaching singing, and I thank them for inspiring me to continue in this lineage of practice:

- Richard Miller, *The Structure of Singing* (1996)
- Brenda Smith & Robert Sataloff, *Choral Pedagogy* (2003)
- Scott McCoy, *Your Voice, an Inside View* (2012)
- Kari Ragan, *A Systematic Approach to Voice: The Art of Studio Application* (2020)
- Janice Chapman, *Singing and Teaching Singing*, (2023)

Figure 11: Vocal Pedagogy Hierarchy Comparison



The table compares the hierarchy of vocal pedagogy concepts across six different sources. A vertical arrow on the left indicates the sequence from 'First' at the top to 'Last' at the bottom. A horizontal arrow at the bottom indicates the progression from 'Newer' on the left to 'Older' on the right.

	<u>Kovacs (2024)</u>	<u>Chapman (2023)</u>	<u>Ragan (2020)</u>	<u>McCoy (2012)</u>	<u>Smith & Sataloff (2003)</u>	<u>Miller (1996)</u>
	Body	Body	Respiration	Resonance	Posture	Onset
	Breath	Breath	Phonation	Respiration	Breath	Breath
	Phonation	Phonation	Registration	Phonation	Phonation	Resonance
	Registration	Registration	Articulation	Registration	Resonance	Articulation
	Intonation	Resonance	Resonance	Articulation		Registration
		Articulation				Vibrancy

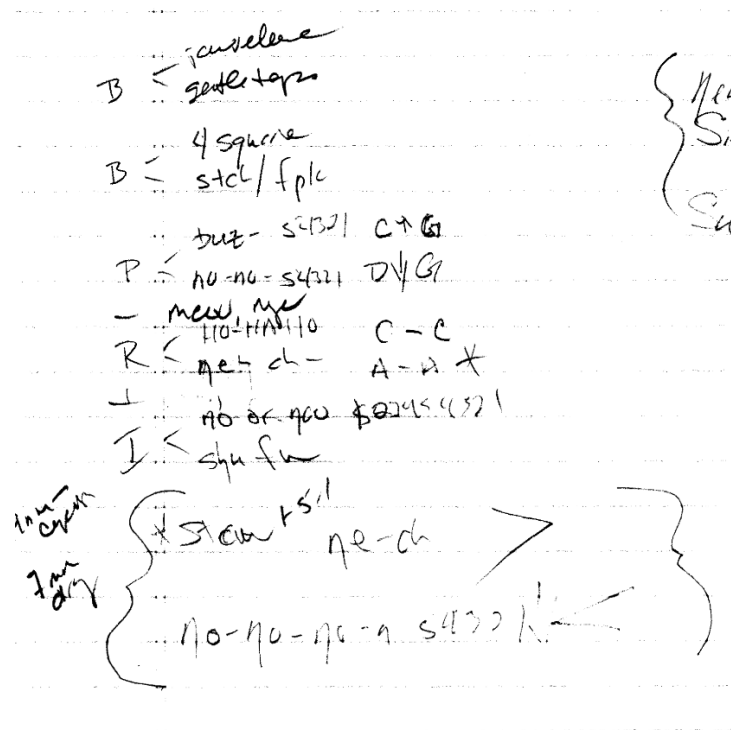
While there are a few clear differences in the order of what fundamental parts of technique are taught first, these can be partially explained by the nature of the texts from which they are drawn; for example, McCoy stresses resonance as an early concept because of the importance he places on all other aspects of vocal production on the effect of resonance; therefore, one learns about the end point to which the others provide success (McCoy, 2012b). However, in general, the movement from postural alignment (body) through to resonance and intonation (which are synonymous in this project) is uniform across the methodologies, and I have included several exercises in the card deck based on the Alexander Technique, a technique for improving posture and movement (Kleinman and Buckoke, 2013). Another important outlier is "articulation," which Ragan and others emphasize. In developing my methodology, I wanted all the steps to fit as a list on one hand (five fingers), so articulation is folded into the Warm-Up Card deck as a subcategory and identified as so in the lower right corner of the front of the card.

Know How

I have been engaged in the practice of VWU since joining my junior high school choral ensemble. The impact of this long period of practice (43 years) on my procedural knowledge cannot be overlooked, and lineage of practice plays a large role in my procedural knowledge, as I learned and adopted various VWU from my teachers and conductors. I credit my high school choral conductor, Larry Wittig, and his teacher, Mel Kinney, for my first introduction to a systemic methodology for learning to sing: *How to Train Singers* (Henderson, 1979). Henderson served on the voice faculty of several universities and conservatories and was writing at a time before Richard Miller (1996) and after William Vennard (1968); however, she included in her methodology postural and breath considerations missing from other volumes of its time. More importantly, this methodological approach in choral classrooms as a student ingrained in me the importance of systematic, evidence-based approaches to teaching singing, which would be reinforced by subsequent studio teachers and pedagogically informed choral directors (McCoy, 2011, 2012a; McCoy and Ragan, 2018; Bozeman and Ragan, 2021; Holding and Ragan, 2022). I found myself relying on this book when I became a teacher of junior high school voices as I expanded my understanding of adolescent voices and found that the enjoyment (fun!) I experienced singing them was present when I taught them. Six of the Henderson exercises are included in the Vocal Warm-Up Cards, each based on sound pedagogical principles reiterated in current science.

While I have been gathering a vocabulary of vocal warm-ups for more than four decades, I have also been employing them in my teaching in choral classrooms, voice studios, and adult choral ensembles. One important part of practice for me is that I nearly always write down my warm-ups for that session in my preferred pedagogical order. An example of this can be seen in my handwritten studio notes where *B, B, P, R*, and *I represent Body, Breath, Phonation, Registration* (called range in the Vocal Warm-Up Cards), and *Intonation* (see Figure 12 below). I have been refining my VWU repertoire for many years, making changes contemporaneously to assist the student or choir in finding ease or efficiency in experiencing vocal learning and for different environments, such as a particularly live acoustic that a choir or singer is performing in (McHenry, Johnson and Foshea, 2009). Authors such as Marchand, et al, suggest using formal rubrics such as the EASE (Evaluation of Ability to Sing Easily) in evaluating vocal warm-ups (Marchand, Kavaliunas, and Cassol, 2019). While the time allowed for this project did not permit such an assessment, it is helpful to identify these potential tools for future development of the project.

Figure 12: Field Note: Vocal Warm-Up preparation



Know What

The prototype of the Vocal Warm-Up Cards succeeds in several ways: it projects sound pedagogical principles in a repeatable, organized way; they are usable by teachers, conductors, and students alike, and they add an element of variability to learning through a familiar and popular format (Samuli Kuosa, 2016; Silva Vieira, Rocha Tavares and Chaimowicz, 2023). The Vocal Warm-Up Cards specifically address the development and improvement of singing technique using a systematic approach found in vocal pedagogical literature and framed by my experience as a voice teacher, choral director, and professional singer (Smith and Sataloff, 2013; McCoy and Ragan, 2018; Kovacs, 2022). With a focus on the technical aspects rather than the artistic aspects of singing, the Vocal Warm-Up Cards isolate and sequence the fundamental skills needed for singing, including *Body*, *Breath*, *Phonation*, *Registration/Range*, and *Intonation* (Miller, 1996a, 1996b; Kovacs, 2024). My experience with these concepts and the ability to update my understanding of them through the research included in this project have permitted me to be creative in developing, designing, and realizing the Vocal Warm-Up Cards prototype, and I anticipate several updates and additions in the future as testing, use, and with changes in pedagogical knowledge and practice develop (Kolb, 2015; Nelson, 2022).

Discussion & Conclusion

Ultimately, how I teach singing is how I designed the Vocal Warm Up Cards. They directly reflect my practice and influence on my experience, with the added benefit of revisiting and revising my propositional knowledge about VWU. If I were to emphasize one area of greatest change in my methodology due to this process, it would be the increased inclusion of SOVTE for phonation (Titze, 2006; Duke et al., 2015; Savareh et al., 2023). As I look over the reflective journals, matrices, and workbooks I designed to support this project, I am reminded of how much information has to be analyzed and ordered to create a concise, legible product that reflects the propositional and procedural knowledge underpinning the tools we use to teach with (Creswell, 2014; Scott, 2022). The consequence of this observation is that I continue to learn as a researcher how to edit the scope of a project to fit the permitted time and resources (including document word count). Further, as an insider researcher, I encountered how one's lineage of practice and bias can intersect, mainly where my procedural knowledge about VWU inherited from other teachers and choral directors needed to be critically examined, clarified, and changed (Breen, 2007; Winter, 2023).

Applying this learning with respect to research is to continue refining my critical research practices, including time management and critical reflection. Deeply embedded into this project is my critical reflection log of the literature; however, I feel less integrated with the Kolb and Nelson reflective models and may consider how to adapt future projects to encourage a deeper understanding of their benefits. In addition to the professional and academic benefits described above, I feel I have improved my creative skills in developing tools that support the learning and performing environments I move in. While I have typically shied away from creating visual art, this project has shown me a way to express creativity while doing so through the lens of research triangulation and practice (Nelson, 2022).

I feel that this project has successfully responded to the problem presented at the beginning of this paper: that there is a lack of consistency and understanding among Choral Musicians in applying the best practices of voice pedagogy in Vocal Warm-Ups in the voice studio, practice, and choral rehearsal. I have accomplished this through the introduction of Vocal Warm-Up Cards, a systematic approach to generating VWU based on current research in theory and practice of vocal warm-ups and p

I will conclude with what I think are the next steps for the project and how I think the Vocal Warm-Up Cards might be revisited to close some apparent gaps. With the deck still in

prototype, I would like to print several more copies and distribute them to friends, colleagues, and students to work with. I want to engrave musical examples for those cards that need them, change the card and font colors so they are more visually accessible, and increase the overall size in the next version. Also unaddressed in this version are the ways culture, learning styles, and reflective practice might be integrated more consciously into the content (Jones and Alinier, 2015; Farashahian, 2018). Further, I would like to create several expansion packs, three of which are for specific pedagogical circumstances: one for trans and non-binary voices (Sauerland, 2022), one for senescent (aging) voices (Trost, 2022; Kovacs, 2024), and one for adolescent singers (Brunssen, 2018). Other possibilities include an expansion deck for people rehabilitating their voice for singing or speech (Manjunatha, Nayak, and Bhat, 2022), addressing the needs of female voices experiencing perimenopause and menopause (Bos, Bozeman and Frazier-Neely, 2020), and specifically for choral rehearsal (McCarther, 2023). The entire system has commercial potential and could help advance the cause of voice pedagogy in choral rehearsals, studio, and among all choral musicians so they can achieve and maintain healthy techniques for lifelong singing.

Word count this section: 4,652
Total word count: 9,432

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Appendix A: Vocal Warm-Up Cards Prototype

Vocal Warm-Up Deck INSTRUCTIONS

Your Vocal Warm-Up Cards are divided into five "suits" or categories of use based on the type of warm-up. On the front of each card is the category, name of the warm-up, and the subcategory of the exercise. On the reverse side, the card and warm up name are followed by the card number (identifier) with instructions on how to practice the warm-up in the middle and at the bottom is the "why" of the exercise.

There are two "wild cards" that invite you to improvise your own warm-up. You can include these in your deck or exclude them depending on your comfort with designing your own vocal warm-ups!

1. Begin by separating the cards by suit: Body, Breath, Phonation, Range, and Intonation. The cards are color-coded to assist you in easily identifying the categories of use.
2. For a warm-up of about 10 – 15 minutes, draw two cards from each category.
3. For best results, the cards should be played (practiced) in order: Body, Breath, Phonation, Range, and finally Registration. (Think of it like moving through the phases of sitting, standing, walking, running, and flying.)
4. For a longer warm up, choose three cards from each, for a shorter warm-up choose just one. If you want to focus on a particular aspect, choose three or four from that category and do just one of each of the others.

BODY BODY TAPS Brain-body	BODY: Body Taps (1) <i>Begin at the top of the head, gently tapping your fingers from the crown of your head to the tips of your toes!</i> Helps activate the brain-body connection.
BODY KNEE LIFTS Alignment & posture	BODY: Knee Lifts (2) <i>Gently lift one knee while balancing on your other foot, hold for five seconds, and then switch sides. Do this three times. Hint: place one hand on a chair for balance!</i> Helps release the psoas muscle.
BODY HEAD AND NECK ROLLS Alignment & posture	BODY: Head and Neck Rolls (3) <i>Rotate your head toward your shoulder, head, then back around. Remember: soft limits, don't stretch until it hurts!</i> Release and relaxation of the long muscles of the neck.

BODY SIDE STRETCHES Breath-Body-Mind	BODY: Side Stretches (4) <i>Palms touching above your head, lean to the left while you inhale. Exhale as you come back up. Switch sides.</i> Release and relaxation of the costal and intercostal muscles for respiratory efficiency.
BODY HIP SWIVELS Alignment & posture	BODY: Hip Swivels (5) <i>With your feet shoulder width apart (directly under your hips) make figure 8's for ten seconds in one direction and ten seconds in the other.</i> Release and relaxation of the hips & lower abdomen, promoting efficiency in breathing
BODY HOKEY POKEY Brain-Body	BODY: Hokey Pokey (6) <i>Raise your left hand in front of you just below shoulder height and shake your hand, switch sides. Raise your left foot (use a chair for balance if you need to!) and shake- then do the right foot. Repeat 3 - 5 times, getting faster as you go!</i> Activates the brain-body connection

BODY SHOULDER ROLLS Posture & Alignment	BODY: Shoulder Rolls (7) <i>Shrug your shoulders once, then roll both shoulders forward five or six times, then backwards. Then roll them opposite each other, then roll them in the "other" opposite direction!</i> Relaxes shoulder joints promoting ease in
BODY JAW RELEASE Muscle Tension	BODY: Jaw Release (8) <i>Start with your thumbs in the space below your ear at the back of your jaw. Gently rub downward following the jawline until you get to your chin. Do this three times.</i> Relaxation of the muscles of the tongue and jaw.
BODY RAGDOLL Body-breath	BODY: Ragdoll (9) <i>Standing with feet about shoulder width apart, let the top half of your body fall forward as you exhale, reaching for your toes (remember: soft limits, don't extend to the point of pain!) As you lift your upper body from your hips, inhale and come to a relaxed standing position. Do this three times.</i> Release and relaxation of the muscles of the back

BODY SCAN & RELEASE Mind-body	BODY: Scan & Release (10) <i>With your eyes set on a "soft gaze," inhale as you mentally scan your body from top to bottom, noticing any places you might be tense. As you exhale, imagine you are releasing the tension from that place in your body. Scan three times.</i>
BREATH BEACH BALL Alexander Technique	BREATH: Beach Ball (11) <i>Standing tall, pretend you are holding a beach ball in front of your body at your hips. As you inhale, imagine the ball getting bigger as your arms expand. As you exhale, push against the imaginary beach ball until it's empty. 3 - 5 times.</i> Promotes appropriate upper body engagement for breathing while singing.
BREATH HALF WINDMILLS Alexander Technique	BREATH: Half Windmills (12) <i>Place the knuckles of one hand behind you in the small of your back. As you inhale for a count of four, raise your free hand to just about shoulder height. Exhale for eight seconds, lowering your hand to your side as you go. Do this three times, then switch sides!</i> Pacing of breath, body alignment, & body-breath awareness.

BREATH SQUARE BREATHS Breath-Body- Mind	BREATH: Square Breaths (13) <i>Sitting or standing comfortably with a soft gaze, inhale for four seconds, hold the breath for four seconds, exhale for four seconds, and hold for four seconds. Repeat 3 - 5 times.</i> Assists in deactivating the prefrontal cortex, engages breath-body-mind connection.
BREATH HOO-K Onset, Articulation	BREATH: HOO-K (14) <i>Without phonating (should sound like a loud whisper), repeat the sound "hoo" four times. On the fourth time, add a "k" on the end (the fourth sound will be the whispered word "hook.") Repeat this 5 times.</i> Encourages efficient onset and rehearses efficient vowel shaping/tuning.
BREATH STICH Articulation, SOVTE	BREATH: Stich (15) <i>Rhythmically repeat the sounds: /s/-/t/-/s/-/t/-/ch/-/ch/-/ch/ five times in a row, all on one breath!</i> Develops consistency of airflow while articulating consonants.

BREATH 4/8 HISS SOVTE	BREATH: 4/8 Hiss (16) <i>Inhale through the nose for 4 seconds, and exhale for 8 seconds through a "hiss." Work to keep the pitch of the hiss high and consistently the same.</i> Encourages the sensation of consistent, appropriate airflow.
BREATH SHORT & LONG HISSES SOVTE	BREATH: Snake (17) <i>Without stopping the breath, rhythmically articulate four "s" sounds in a row, with the fourth "s" about four times as long as the first three.</i> Encourages efficient breathing mechanics.
BREATH WAVEY SNAKE SOVTE, Dynamics	BREATH: Snake (18) <i>Making an "s" sound, create crescendos and decrescendos in waves until you need to take a breath. Repeat 3 -4 times.</i>

BREATH COOL HAND LUKE Breath-Body Connection	BREATH: Cool Hand (19) <i>Holding your hand (palm toward you) about six inches from your face, make five short exhales (as though you were blowing out a candle) creating a cool spot in the palm of your hand.</i> Encourages breathing efficiency
BREATH SHOO WHO? Articulation	BREATH: Shoe Who? (20) <i>Rhythmically whisper the sounds /shoo/-/foo/-/too/-/hoo/ four times, elongating the final "hoo" on the last repetition. Repeat 3 - 5 times.</i> Articulation practice with forward placement of vowel sound.
PHONATION BUZZY LIPS SOVTE	PHONATION: Buzzy Lips (21) <i>Deep inhale, and slide from 1 - 5 - 1 while making "buzzy" or "raspberry" lips. (Tip/hack: if you can't buzz your lips, you can place a finger against each side of your mouth to help!).</i> Encourages ease of phonation by increasing intraoral air pressure.

PHONATION TOUNGUE TRILLS SOVTE	PHONATION: Tongue Trills (22) <i>Inhale through the nose and roll your tongue while sliding up and down at random pitches. Start in the low (chest) voice, and trill upwards into your head voice. Do this 3 - 4 times</i> Encourages ease of phonation by increasing intraoral air pressure.
PHONATION CHEWING NOISES SOVTE	PHONATION: Chewing Noises (23) <i>Make chewing sounds- mouth closed- high in the voice for 5 - 10 seconds.</i> Encourages ease of phonation by increasing intraoral air pressure.
PHONATION 5 NOTE SLIDES SOVTE	PHONATION: 5 Note Slides (24) <i>Starting in the low (chest) voice, hum 1 -5- 1 sliding from the bottom pitch to the top pitch (portamento). Repeat up 1 / 2 step each time until just below the upper (head) register</i> Encourages ease of phonation by increasing

PHONATION BUH-BUH SOVTE	PHONATION: Buh-Buh (25) <i>Starting just below the head register, sing 5 -4-3-2-1 on the syllable /buh/. Repeat down 1 / 2 step until at the bottom of your comfortable range.</i> Encourages ease of phonation by increasing intraoral air pressure.
PHONATION HUNG-AH Onset	PHONATION: Hung-ah (26) <i>Quickly sing the word "hung" on the first scale degree, then portamento (slide) up to the fifth scale degree *while singing the /ng/ sound.* At the top pitch, open to /ah/ and return 5-4-3-2-1 on the vowel. Repeat in rising half steps as long as comfortable (no tongue or larynx tension).</i> Uses the "h" sound to encourage easier onset
PHONATION FLAH-FLAH NEE Functional	PHONATION: Flah-Flah Nee (27) <i>On the syllables /flah/-/flah/-/nee/ sing the pitches 1 -3 - 5-4-3-2-1 extending the /nee/ during 5 4 3 2 1.</i> Used the "f" to encourage vocal flow and the

PHONATION MAJOR ME Functional	PHONATION: Major Me (28) <i>Hum a major third with portamento (1-3-1) and open to "mee" on the final note.</i> Ease of phonation with decreased range while practicing vowel placement.
PHONATION ZINGERS Articulation & Function	PHONATION: Zingers (29) <i>Sing the word "zing" once on each note: 5-4-3-2-1-5-1 (whole step increments, descending or ascending)</i> Uses the "z" sound (voiced consonant) to encourage vocal flow for onset.
PHONATION OO-EE! Functional	PHONATION: Oo-ee (30) <i>Uses the "z" sound (voiced consonant) to encourage vocal flow for onset.</i> Practices vowel articulation and intonation using release of subglottic pressure (downward

RANGE DOVE DUCK GOOSE Vocal Registers	RANGE: Dove Duck Goose (31) <i>Saying three times in sequence: "Coo-Coo-Coo" high in the voice, then "quack-quack-quack" low in the voice, then "honk-honk-honk" in the middle or mixed voice. Repeat three times</i> Practices the sensations of vocal registration (head, chest, mix).
RANGE WHOO! Vocal Registers	RANGE: Whoop! (32) <i>High in the voice, say the word "whoop" three times. Breathe & repeat three times.</i> Practices the sensation of head voi
RANGE SIGH! Vocal Registers	RANGE: Sigh (33) <i>Starting high in the voice (head register) say the word "sigh" as you descend in pitch to the bottom of your range. Repeat three times. (Flip this one on it's head and go from bottom to top!</i> Promotes unity and ease of registration across

RANGE HO HA HO Onset	RANGE: Ho Ha Ho (34) <i>Starting in the low (chest) voice, sing the syllables "Ho-Ha-Ho-Ha- Ho" on 1-3-5-3-1. Ascend in 1 / 2 step increments into the head voice.</i> Uses staccato onset assisted by the "h" to easily negotiate the register change while ascending (adding subglottic pressure).
RANGE OH HOW I LOVE TO SING Extension	RANGE: Oh how I love to sing (35) <i>Sing the words "Oh how I love to sing" on the pitches 1-3-5-8-5-3-1 ("love" gets two pitches, 8-5). Repeat rising in 1 / 2 step increments.</i> Builds ease in moving through the range (over a registration change).
RANGE ZEE-AH! AH-EE! Articulation	RANGE: Zee-ah! Ah-ee! (36) <i>Slide up (portamento) from 1 on "Zee" to 5, singing "Ah", (staccato), "Ah" again on 5, slide down to 1 landing on "ee". Repeat rising in 1 / 2 step increments.</i> Combines staccato and legato articulation while

RANGE YA YA Extension	RANGE: Ya Ya (37) <i>Sing the syllables "ya-ya-ya-ya-yaaaah" on 5-4-3-2-1 (long bottom note). Descend in 1 / 2 step increments to the bottom of the voice.</i> Extends the range (downward).
RANGE My, My, My Extension	RANGE: My, My, My <i>Sing the words "My My My My" on 8-5-3-1. Sing in descending 1 / 2 step increments.</i> Extends the range (downward).
RANGE LAUGH, SOB, SIGH Vocal Registers	RANGE: Laugh, Sob, Sigh (39) <i>Practicing "laughing" (exaggerated, loud), "ha ha's" low in the voice, then make sobbing sounds "Boo Hoos" high in the voice, followed by "sighs" (sad laments) from high to low.</i> Practices registers with higher subglottic air

RANGE SHU FA FUN Subcategory	RANGE: Shu Fa Fun (40) <i>Sing the syllables "Shu-Fa-Fun-Fun-Fuuuun" on pitches 5-8-3-5-1 (long bottom note). Can be done ascending or descending in 1 / 2 step increments.</i> Extends the range and practices vowel placement in different registers of the voice.
INTONATION JUST SWELL Bel Canto	INTONATION: Just Swell (41) <i>Sing the syllables "nee-nay-nah-noh-noo" on unison pitch while crescendoing from mezzo piano (nee) to forte (nah) and back down to mezzo piano (noo).</i> Joins the registers of the voice and practices efficient vowel placement.
INTONATION KEE KAW Articulation	INTONATION: Name <i>Sing the syllables Kee, Kaw, Kee, Kaw, Kee, staccato on pitches 5 ,4,3,2,1. Repeat descending in 1 / 2 steps.</i>

INTONATION NOODLES Pitch discretion	INTONATION: Noodles (43) <i>Alternating between the pitch and its upper neighbor (whole step), sing "nee", then "ney", "na", "no" and finally "noo," sustaining the last pitch).</i> Practices discrete pitch change and efficient vowel placement.
INTONATION MEOW! Resonance	INTONATION: Meow! (44) <i>Sing the word "meow" once on each pitches: 5,4,3,2,1. Repeat descending in 1 / 2 step increments.</i>
INTONATION GNYA-GNYA Resonance	INTONATION: Gnya-Gnya (45) <i>Sing the word "Gnya" (nasal tone) once each on pitches 5,4,3,2,1. Repeat descending in 1 / 2 step increments.</i>

INTONATION VOWEL SLIDES Subcategory	INTONATION: Vowel Slides (46) <i>Slide (portamento) on 1-5-1 first on /oo/ then /ah/ then /ee/, (three times on the same pitch. Repeat rising in 1 / 2 step increments.</i> Practices the sensations of resonant vowel
INTONATION SCALE NUMBERS Pitch Discretion	INTONATION: Scale Numbers (47) <i>Sing the numbers 1,2,3,4,5,6,7,8,7,6,5,4,3,2,1 on the corresponding scale degrees. Repeat in 1 / 2 step increments. Fun tip: turn this one upside down for a change-up!</i> Practices intonation of scale degrees using
INTONATION SOFT SWINGS Register Practice	INTONATION: Soft Swings (48) <i>Sing the syllables "nee-ah" sliding from 1 (nee, forte) and ccrescendoing to -5 (ah, piano, on the top), then 5,4,3,2,1 on the syllable ah (still piano).</i> Practices making vowel changes during a dynamic change, improves vowel resonance strategies and practices registration.

INTONATION KOO-KOO Articulation	INTONATION: Koo-Koo (49) <i>Sing the syllable "koo" on 1-3-5-4-3-2-1. Repeat in 1/2 step increments. Fun tip: change out "koo" for "kee" or "kay."</i> Practices the sensations of resonant vowel
INTONATION M&M'S Resonance	INTONATION: M&M's (50) <i>Sing the syllables "mee-may-mah-moh-moo" on the 5th scale degree, descending 5,4,3,2,1 on moo. Repeat rising in 1/2 step increments.</i> Practices the sensations of resonant vowel placement with pitch change.
WILD CARD IMPROVISE! Applied Understanding	WILD CARD: Body and/or Breath (51) <i>Create a warm-up of your own that encourages or promotes ease in body alignment or breath engagement for singing.</i>

WILD CARD IMPOROVISE! Applied Understanding	WILD CARD: Phonation and/or Range (52) <i>Create a warm-up of your own that encourages or promotes ease in phonation and/or extending singing range.</i>
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Appendix B: Gantt Chart
(Project Detail)

		Project Start:	Wed, 6/12/2024	
		Display Week:	1	
TASK	ASSIGNED TO	PROGRESS	START	END
Methods Research & Project Design				
Methods Coursework		100%	6/19/24	7/31/24
Project Outline and Design		100%	7/27/24	8/1/24
Resourcing the project		100%	8/1/24	9/15/24
Rough Design of Artefact		100%	7/31/24	9/15/24
Artefact Prototype		100%	9/15/24	10/5/24
Literature Selection & Analysis				
Scope and Criteria		100%	7/27/24	8/15/24
Initial Review		100%	8/19/24	8/30/24
Read and Reflect		100%	9/1/24	9/15/24
Critical Evaluation (Kolb Journal)		100%	9/15/24	9/30/24
Portfolio				
Introduction		100%	9/1/24	9/5/24
Program of Study		100%	9/5/24	9/15/
Critical Review (Kolb)		100%	9/15/24	9/30/24
Evaluation				
Introduction		100%	10/1/24	10/5/24
Review: Know How		100%	10/1/24	10/10/24
Review: Know That		100%	10/5/24	10/15/24
Review: Know What		100%	10/5/24	10/15/24
Conclusion:		100%	10/12/24	10/15/24

Appendix C: Literature Inclusion Matrix

Reference							Type/Tier	Relevance			
Title	Author	Year	Abstract	SeL	Scanned	Coded	Type	Reas. ?	E	T	M
Graphic Design Values in Educational Gaming Cards	Farashahian	2018	Yes	Yes	Yes	Yes	P2	Yes	No	Yes	Yes
Design Based Tools: a review and analysis of 155 card decks	Roy	2019	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	Yes
A History of Playing Cards	Eaton	2014	No	yes	Yes	Yes	G2	Yes	Yes	No	No
A Constructivist, Modeling Methodology for the Design of Educational Games	Kordaki	2015	Yes	Yes	Yes	Yes	P1	Yes	No	Yes	Yes
Exploring reinforcement learning approaches for drafting card games	Viera	2021	Yes	Yes	Yes	Yes	P2	Yes	No	Yes	Yes
Supporting Student's Learning Experiences... cue cards	Jones	2015	Yes	Yes	Yes	Yes	P1	Yes	Yes	Yes	Yes
Collectible Game Cards as Learning Tools	Turkay	2012	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	Yes
Digital card games in education	Kordaki	2016	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	Yes
Efficacy of ...distraction cards...reducing anxiety	Bayar	2024	Yes	No	Yes	Yes	P1	No	No	Yes	No
Deck of cards method ... fuzzy sets in decision making	Garcia-Zamo	2024	Yes	No	No	Yes	P1	No	No	Yes	No
Development and demonstration of a SWOT in a box	Lyons	2023	Yes	Yes	Yes	Yes	P1	Yes	Yes	Yes	Yes
Executive function training in family card games	Gu	2024	Yes	No	Yes	Yes	P1	Yes	Yes	Yes	Yes
Designing a card game	Kuosa	2016	No	Yes	Yes	Yes	G1	Yes	Yes	Yes	Yes
The Playing Card Platform	Altics	2016	No	Yes	Yes	Yes	G2	Yes	Yes	Yes	Yes
The Anatomy of Tone	Jordan	2017	No	Yes	No	Yes	G1	Yes	Yes	Yes	Yes
Singing and Teaching Singing	Chapman	2023	No	Yes	No	Yes	G1	Yes	Yes	Yes	Yes
Your Voice an Inside View	McCoy	2019	No	Yes	No	Yes	G1	Yes	No	No	Yes
The Art of Singing	Miller	1996	No	Yes	No	Yes	G1	Yes	No	Yes	Yes
The Free Voice	Reid	2018	No	Yes	No	Yes	G1	Yes	Yes	Yes	Yes
Bel Canto Principles and Practices	Reid	1990	Yes	No	No	Yes	G1	No	Yes	Yes	Yes
Singing the Mechanism and Technique	Vebbard	1967	No	Yes	No	Yes	G1	Yes	Yes	No	Yes
The Structure of Singing	Miller	1996	No	Yes	No	Yes	G1	Yes	Yes	Yes	Yes
A systematic approach to voice	Ragan	2020	No	Yes	No	Yes	G1	Yes	Yes	Yes	Yes
Choral Singing and Healthy Voice Production	Howard	2015	No	Yes	No	Yes	G1	Yes	Yes	Yes	Yes
Principles of Voice Production	Titze	2000	No	Yes	No	Yes	G1	Yes	No	No	Yes
The Science of the Singing Voice	Sundberg	1987	No	Yes	No	Yes	G1	Yes	Yes	No	Yes
Choral Pedagogy	Smith	2013	No	Yes	No	Yes	G1	Yes	Yes	No	Yes
Queering Vocal Pedagogy	Sauerland	2022	No	Yes	No	Yes	G1	Yes	Yes	No	Yes
Choral Pedagogy and the older singer	Sataloff	2020	No	Yes	No	Yes	G1	Yes	Yes	No	Yes
The Evolving Singing Voice	Brunessen	2018	No	Yes	No	Yes	G1	Yes	Yes	No	Yes
Singing through change	Bos	2021	No	Yes	No	Yes	G1	No	No	Yes	Yes
How to train singers	Henderson	1979	No	Yes	No	Yes	G2	Yes	Yes	Yes	Yes
Overtone of Bel Canto	Coffin	1980	No	Yes	No	Yes	G1	Yes	Yes	No	Yes
Vocal Faults	McKinney	1982	No	Yes	No	Yes	G2	Yes	Yes	No	Yes
Alexander Technique for Musicians	Kleinman	2013	No	Yes	No	Yes	G1	Yes	Yes	No	Yes
What happens during vocal warm up	Sundberg	1995	Yes	Yes	Yes	Yes	P2	Yes	No	Yes	Yes
The Effects of Three Physical and Vocal Warm Up Procedures	Grady	2018	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	Yes
Singer and Listener Perception of Vocal Warm Up	Moorcoft	2012	Yes	Yes	Yes	Yes	P2	Yes	No	No	No
The Effect of Traditional Singing Warm-up Versus SOVTE	Duke	2014	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	Yes
The Effect of Specific Vs Combined Warm Up	McHenry	2008	Yes	Yes	Yes	Yes	P2	Yes	Yes	No	Yes
Effectiveness of Ease Scale in development of Vocal Warmup	Marchand	2017	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	Yes
Quantifying Subjective and Objective Measures of Singing	Ragsdale	2020	Yes	yes	Yes	Yes	P2	Yes	No	No	Yes
Objective Analysis of Vocal Warm Up	Vintturi	2000	Yes	Yes	Yes	Yes	P2	Yes	Yes	No	Yes
Measurements of acoustic speaking voice after warm up	Onofre	2015	Yes	Yes	Yes	Yes	P2	Yes	Yes	No	Yes
Can straw phonation be considered a warm up	Manjunatha	2020	Yes	Yes	Yes	Yes	P2	No	Yes	No	Yes
Comparison of effects produces by physiological versus... vocal warm-up	Portillo	2017	Yes	Yes	Yes	Yes	P2	No	Yes	No	Yes
Effectics of Straw Phonation Protocol on Acoustic ...	Manternach	2017	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	Yes
Effects of wamup on the mind-body ...choral performances	Katada	2022	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	Yes
Exercise Science Principles and vocal warm-up	Hoch	2017	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	Yes
Vocal Technique and the Choral Warmup	McCarthy	2023	No	Yes	Yes	Yes	G1	Yes	Yes	Yes	Yes
Critical Pedagogy and the Choir	Hill	2021	No	No	Yes	Yes	G1	No	No	Yes	No
Effects of rehearsal sequence on musical expressivity	Hurley	2022	Yes	Yes	Yes	Yes	P2	Yes	Yes	Yes	No
Choir warm-ups: how effective are they	Titze	2000	No	Yes	Yes	Yes	G2	Yes	No	Yes	No

Appendix D: Critical Reflection of the Literature

<u>Title</u>	<u>Author</u>	<u>Context</u>	<u>Initial Reaction to Content</u>	<u>Reflection and Analysis:</u> <u>perspectives,</u> <u>intersections, and</u> <u>biases</u>
Graphic Design Values in Educational Gaming Cards	Farashahian	Multidisciplinary group of authors writing for an academic journal introducing a seven point method for a graphical approach to creating gaming cards	Author is writing in a language other than their primary. Author considers the benefits of gamifying/educational card games for students experiencing disadvantages and who lack access to technology. Author stresses importance of graphical design values in educational card game design, citing examples from Iran.	Author makes a compelling argument for game theory as a style of communication, and thus the importance of clear, concise cues that lead the learning through modal play. I am noting the complexity discussed in "Exploring reinforcement strategies" with respect to CCGs, where the game play is so complex algorithmic cueing systems must be built into the game design.
Design Based Tools: a review and analysis of 155 card decks	Roy	Co-authors writing for an academic journal who systematically inventoried and analyzed 155 card decks used in design.	Authors survey the long history of using design cards as a tool for inspiring creativity in design and building (Cool!) They contribute to problem solving and developing systematic design methods in their users.	In terms of design, some meta elements from this paper to bring forward: systematic design, human centered design, and domain specific design.

A history of playing cards	Eaton	Student paper (bachelor in design) lightly referenced.	Very brief student paper which establishes the history of playing cards as a 52 deck card in the west. Notable points include the printing press as having helped popularize, though it "diffused the artform.:"	Point to carry forward are the multiple use of cards other than playing deck: education (Louis XIV had an educational deck), propaganda, advertising, fortune telling, and decorative arts.
A constructivist modeling methodology...gaming cards	Kordaki	Academic author writing for a scientific research journal. Proposes a constructivist paradigm for a three-domain approach to designing educational game cards.	The author justifies gamifying learning from a constructivist (learners must actively create knowledge) POV by citing Piaget , among other learning scientists. Further, author proposes a seven-point system for creating a card game.	I can modify the methodology for creating a card game to fit the needs of this project: 1) Define the subject matter and model 2) Define the aims of the card game 3) Define appropriate activities 4) Define ways to overcome difficulties 5) Define motivations for play 6) Define scaffolding (information about the concepts being taught) with additional cards 7) Define the rules of play
Exploring reinforcement...drafting.. Collectible card games	Viera	Multidisciplinary group of authors writing for a professional journal, examining the effectiveness of AI modeling the two primary tasks of card gaming: deck building and battling.	This is really an in-depth exploration of the decision making process and how AI CCGs can reinforce a specific (stochastic sequential) decision making model in game play, and proposes	The primary impact of this article for me is that it makes clear the idea of modes of play, which for me include solo/studio and choral, with sub modes that might include "random stack

			an algorithm for creating an agent the promotes the approach in game design.	build" and "build by suit (domain).
Supporting Student's learning...cue cards	Jones	Pair of research authors writing for a medical journal. Article explores reflective practice as it applies to measuring achievement in nursing students using a cue card "portable reflective stimulation framework" as a structured support tool for maximizing learning outcomes.	The article stresses the value of cue cards in assisting with the reflective process in nursing students as they learn new procedures through simulation technology. I think the key takeaways here include the data supporting cue cards as part of integrated learning and the idea that my card deck proposal is somewhere in between gamifying and cue card, here referred to as a "portable stimulation framework"	While the authors are writing about an educational process specific to the medical profession, they are considering the importance of reflective processes in learning and looking at cue cards (portable reference framework" as an important and timely method for cueing reflection in the context of the learning environment. This approach emphasizes (for me) the benefits of having an in-the-moment set of cues to support learning as it happening, if not over time..
Collectible Game Cards as Learning Tools	2012	University researchers writing for a scientific research journal, exploring the ecology of learning with respect to creativity, cognition, and	Emphasis here is that learning cards are part of a larger ecology in the learning environment. Social and motivational	The card deck I develop needs to be created in such a way that it fits into multiple ecosystems: choir, voice studio, home practice; and the social and

		logical reasoning as it applies to collectible card games (CCGs).	benefits should not be overlooked.	motivational benefits discussed.
Designing a learning tool for translating resilience	2023	Team of hospital administrators and researchers writing for an international scientific journal. Authors provide their methodology for designing a learning system that enables agents withing a healthcare system to achieve resilience in their practice using graphic tools.	This paper really focuses on developing the methodology for designing a learning tool, moreso than the tool itself; however, the useful information here has to do with promoting the modularity of whatever tool is designed to help it be flexible in its use.	If each suit (body, breath, phonation, range, intonation) is considered modular, then it can be extracted from the deck to work on as a focus. Oh, and- I just realized expansion packs are going to be a part of the overall plan!
Digital card games in education	2017	Faculty and PhD student co-author a systematic review of digital card games (DCG) for academic journal. They analyze the development, structure, use, and impact of DCGs in the classroom over a ten year period with respect to a constructivist paradigm and discuss the success resulting from their use.	This paper is giving a systematic review of educational games in the digital format; however, what interests me about this paper is how the data is presented, the emphasis on constructivism as an educational paradigm, and mapping of learning theory as it occurs within "serious" digital educational card games.	The paper uses "mind maps" to illustrate the theoretical threads of the data analysis. In many ways, this same threading is how the domains of the functional vocal warm ups map out. There is one othe paper that creates a more table-oriented view of the same methodology. With respect to the review data, the threads expand outward from the theoretical node chronologically,

				which could also be adapted to any other sequential thread (body, breath, phonation, range, intonation..)
Development and demonstration...SWOT in a box card game	2024	Authors are writing for a professional journal with respect to transportation risk management and the development, implementation, and results of a card game developed to support transportation planners in identifying the strengths, weaknesses, threats, and opportunities in their milieu.	This paper begins by declaring itself "not a traditional research paper." However, it is a discussion of the data with respect to the generalizability of the methodology (which in this case was specific to the transportation industry) and insights.	Some key takeaways for me on this include: shared learning as a value in design, familiarity of format as a value in design, good "tempo," flexibility, and outcome-focused (which for me is ease with functional vocal warm ups in creating variety, effectiveness, and accuracy of technique/application).
Executive function training in family card games	2024	Pediatric psychologists and cognitive science researchers writing for a scientific journal. The authors examine the use of card games in developing executive function via two classes (family and peer) against a control group using non-gamified information cards.	This paper is really about the effectiveness of learning cards on Executive Function (inhibition, cognitive flexibility, and working memory) and not so much about card design or the effectiveness of the card design as a way to promote the development of an EF training program.	Interestingly, I hadn't considered the idea of an EF training program in a family card game, but as this paper points out, it is inherent in many such educational/learning card systems. Not sure if this is a bias or more of a cultural emphasis, but this study is Chinese, with a subtle discussion of the values of the Chinese educational system.

The playing card platform	2016	Chapter in a text book for analog game studies. Author focuses on the history and development of Magic the Gathering as a case study in CCGs.	Author breaks down the aspects of the playing card itself, including "tapping" (orientation), planarity (flat dimension), ordinality (how the information is displayed), spatiality (the area cards take up), and texture (the way the cards feel in your hand).	My margin notes include thoughts about opponent-based play: there is no real "opponent" in the warm up cards, but maybe the ordinal information still needs to be seen in two directions? (Teacher and student). Since there is no information that needs to be deliberately concealed like a traditional playing card, the obverse might contain more detailed information about the warm up on the recto side. The cards should be of a size that you can easily shuffle. While there is no hierarchy to the suits, I do have a pedagogical preference to the order of warm ups. How do I communicate that? (Ordinal information?) All of this needs to be considered in the layout of the card.
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Designing a card game	2016	Master's thesis for a Finnish university. Author is a game enthusiast studying card design as he pursues a degree in Business Information Technology	Author has analyzed two CCGs (both of which exist in computerized form): Magic the Gathering and Hearthstone, and included a scope and sequence for game development that synthesizes the two. He shows work and progress in developing a first and second prototype before concluding.	Three outcomes for me after reading this paper: 1) create a matrix of "good card game design" qualities from the literature 2) first prototype should be line drawings (then test/play) 3) Add art/color in the second prototype. Other notes include: booster/expansion packs for adding warmups to the original deck. Do the cards/warmups get a difficulty rating? Use of color is important and can be a visual cue. The author is obviously a CCG enthusiast, sometimes I felt like he assumed I knew certain things about game play or those details were not included in his descriptions.
The Anatomy of Tone	Jordan	Application of voice ped to choral tone	Love this book. Walks into the very weedy subject of acoustics, voice ped, and choral singing	Short chapter (9) on the importance of sequencing WU. Good list of "must haves" in choral warm ups.
Singing and Teaching Singing	Chapman	Book endorsed by Sataloff (reviewed) used as a textbook in ped programs	Comprehensive college text. Very much in the "know that" category.	Again, a hierarchy is conferred. Some great examples to borrow from.

Your Voice an Inside View	McCoy	College text written by leading voice pedagogist	Industry standard book for VP in latest edition. Very sciency- with case studies and figures, color images, and spectrographs	The important consideration here is how McCoy organizes his domains- with articulation at the end (Table of all domains across texts)
The Art of Singing	Miller	Seminal volume on the technical approaches to teaching voice. (Note, Miller revised his thinking in some areas before he died but left the academy) Oberlin teacher. 4	Detailed sequencing of the technique of teaching singing. (Much more detailed content than say, Henderson who was writing for Julliard)	Again, author differentiates gender and voice type, which is important to consider in studio work, and sometimes a challenge in the choral rehearsal. How to address this in the card deck?
The Free Voice	Reid	Handbook for teaching singers to create "natural" tone	Author is using singing technique to promote unrestricted tone quality.	Chapter on vocal exercises gives guidance on the principles of WU as well as a pedagogical order. Of particular discussion is the messa di voce, which I include in the deck.
Singing the Mechanism and Technique	Vennard	textbook mid/20th century. College text/research/teaching manual	Seminal work helping to promote science-based approach in voice pedagogy	Not much here to include except that the science based approach to teaching voice is promoted.
The Structure of Singing	Miller	Systemic method for teaching classical voice	Many great warm up examples, especially for registration	Another example of a different hierarchy, perhaps a product of the time it was written in.

A systematic approach to voice	Ragan	Voice teacher/habilitation specialist outlining a systemic method for teaching voice	Current science and theory approach outlined for a studio-based teacher. Kari draws on acoustics, motor learning theory, physiology, and personal experience to give singing teachers a solid methodology for teaching singing technique.	Tons and tons of warm up examples here. Also: need to include in my table of hierarchies.
Choral Singing and Healthy Voice Production	Howard	Handbook for choral directors with topics including physiology, acoustics, management, and theory	Because the book covers "all of it" there's not really a high level of detail for any of it, but it is a very useful guide to the main principles a choral conductor needs in understanding the intersection of voice pedagogy.	There are some helpful graphs that explain why intonation in choral ensembles can be difficult. One thought that arises is that the intonation exercises will need to have a solo and choral (mulit-part) version
Principles of Voice Production	Titze	Vocologist created textbook about physics, acoustics, and physiology of singing	Not a systemic handbook- a science text	Not much here for me to use.
The Science of the Singing Voice	Sundberg	Highly technical text describing the physics of the voice	Not very useful in terms of showing examples.	Good chapter on "the choral voice" and related acoustics.
Choral Pedagogy	Smith	Examines the history and place of vocal ped in the choral milieu	Advocates for a voice & ped approach to choral singing	Chapter "voice building for choirs" advocates for the importance of warming up choirs and the pedagogical sequence of warmups

Queering Vocal Pedagogy	Sauerland	Handbook for teaching trans and genderqueer voices.	This is a seminal work important to our current context, and contains a great deal of pertinent data as well as case studies and examples	The card deck needs to intersect easily with trans and queer voices.
Choral Pedagogy and the Older Singer	2012	& Sataloff (book) Both are experts in the physiology & habilitation of the voice. Sataloff is a top ENT/Voice researcher, and Smith a top choral pedagogue having written several textbooks on the subject	Breaks open the important work of assisting older singers in achieving lifelong singing, including those experiencing natural and diseased aging changes to the voice	Relates this importance of having exercises that are "doable" or at least modifiable intergenerationally (can't stand on one foot? Use a chair for this exercise.)
The evolving singing voice	2018	(Book) Author is an experienced voice pedagogue writing from the perspective of having established a series of "aging choirs"	Karen is a well known clinician and conductor, giver of workshops. She's distilling her wisdom/experience here. The book is well-referenced to current science in voice pedagogy	Looks at the experiences of solo and choral singers across the lifespan. I like that she addresses issues for both solo and choral singers at various stages of life. Clinical and pedagogical perspectives addresses.
Singing through Change	2021	Book written by three women voice teacher/pedagogues filling in a gap in the literature	This book was a game changer when it was published. It's well researched with references to both internet sources and a standard bibliography representing current research and science	Not much by way of data, but a ton of narrative, case studies, and affirmations of experience. Of particular use to me here is the chapter on alternative methods: qui gong movement and

				Alexander Technique.
How to train singers	Henderson	A guide for voice teachers in developing singer's voices	This was the book my high school choral director used.	There's still some good stuff in here, although I have long since modified most of it for studio and choral rehearsal use. Made me realize just how far I've come from singing these in high school. Also will have to score/engrave some of the examples and include icons from the public domain.
Overtones of Bel Canto	Coffin	Textbook/mid 20th century ped & acoustic "manual" written by a Juilliard teacher	While much of the science is outdated, there are acoustic and voice training concepts important to current practice	This reminded me that most of the "books" are going to divide vocalizes into gender and voice types. I need to think about how to address those in the cards.
Vocal Faults	McKinney	Diagnostic handbook for the correction of technical vocal problems	Science-based handbook for guiding teachers of voice and singers through corrective action for as-indexed vocal "faults" or problems.	The chapter on "coordination" is most useful here because it suggests a four-point sequence for warm ups.

Oxford Handbook of Singing	Welch	Major volume outlining the theory and practice of singing	Nix' chapter on "Systematic Development of Vocal Technique" is the focus here.	Nix includes a table for the variations of voice exercises including the effects of those exercises on the voice. *Perhaps include table in paper. *Talk about development of variations of exercises as they have come into use in my practice.
Alexander Technique for Musicians	Kleinman	Text describing practical application of Richard Alexander technique for musicians (instrumental and voice)	Not a lot of examples that will easily carry into the cards.	There's a chapter on movement that will yield a few good examples. Interesting to note how much overlap there is for instrumentalists with AT. Might be worth mentioning.
Vocal technique and the choral warmup	2023	Author is a graduate choral conducting teacher and an applied voice teacher writing for a professional interest journal.	This is a well constructed article that discusses the reasons for a science-based voice pedagogy in then choral warm up and also proposes as succinct methodology for developing choral warmups as an ensemble director.	Talks about the lineage of practice problem: "that's what my choir director always did" and the importance of breaking that cycle. Discusses motor learning theory as important to pedagogical practice in the choral rehearsal with attention to the difference between "know that" and "know how" knowledge and why that applies to practice, as well as the importance of perceptual

				feedback in learning. He also emphasizes that experienced voice teachers have their own pedagogical hierarchy based on experience (Pull quote).
Choral Warm-Ups: How Effective Are They?	2000	Author is a well-known voice pedagogist and vocologist writing for a professional interest journal (NATS)	This is Titze at his worst. He basically denies the value of choral warmups, and instead says that choral directors should "seek out individuals to give them pearls of wisdom" because it's not possible to convey good voice pedagogy to a group of people through a warm up.	He's not a choral musician, and makes several gaffes that betray his inexperience as a music educator beyond the collegiate academic classroom. Rather than seeking out a solution to a hard problem, he dismisses the subject as unworthy of attention. At first I thought this was satire. It's an old article, I hope his opinion on the subject has changed in 24 years.

The Effects of Rehearsal Sequence	2022	Authors are an elementary school educator and university researcher writing for a professional interest research journal.	While this study doesn't directly answer the research question, it does speak to the importance of learning theory in developing pedagogical approaches to music instruction. It might also be a bit of a reach for me to apply child learning theory as discussed in this article to my project.	I think the key takeaway here is that the authors demonstrated that synthesizing learning elements into regular practice (embedding them) learning was more efficient, effective, and longer-lasting.
Comparison of Effects...physiological vs. traditional	Portillo	Multidisciplinary group of researchers writing for a high-impact professional journal.	While not exactly related to the research question, it does help expand the view of WU to CCM singers	Interesting, authors report no perceptible difference in SOVTE vs. "traditional" warm ups.
Can straw phonation...SLPs	Manjunatha	Group of SLP researchers writing for a professional research journal.	Does not directly answer the research questions, but does expand the view of WU to SLPs as professional voice users.	Includes both qualitative (acoustic parameters) and qualitative (perceptive parameters) in reporting that SOVTE are an effective warm up for SLPs.
Immediate Effects of SOVTE as a WU	Savareh	Results of a Master's thesis grant project for a musculoskeletal research center	Direct evidence that SOVTE increase efficiency in the vocal economy, reducing MT and lowering risk of injury to singers.	Rich with data and references. Data confirms many prior studies about the efficacy of SOVTE. Some excellent quotes and definitions. Important connection between the extrinsic and intrinsic muscles in

				regulating the vocal folds. Sample size a little small.
Measurements of Acoustic Speaking Voive	Onofre	Cohort study for a Brazilian University	Shows that speaking F0 increases with warm up, cool-down benefits undetermined; however, there is much in this paper that describes the benefits that are written about in the literature.	This study uses choir singers to examine F0 after warm up, and relies on the idea that singers are trained for their work (which may not be true for choir singers.) Important here is that they explore the historically identified benefits of WU, which they partially dismiss as unproven. PULL QUOTES. "A review of the literature did not reveal any information on the effects of a cooldown." Cool bit about going out after performances as possibly delaying vocal recovery.
Objective Analysis of WU/Ergonomic Factors	Vintturi	Group of Finnish researchers writing for a hi-impact professional journal describing their academic research	Interesting look at how ergonomic factors (standing, sitting, humidity) and gender show up in the effectiveness of warmups.	Vocal Warm-ups are more effective standing up than sitting down, and have greater impact if done in the morning. Good description of the physiological reasons WU work.

Exercise Science Principles and the Vocal WU	Hoch	Authors are university researchers in collegiate music department	This is well researched and constructed article containing a key table comparing the pedagogies of multiple authors	Several key learnings: this paper confirms both my choice of gray literature and my analysis (corroboration!)n It reminds me to think of the sub-domains as taxonomic first, and then to apply hierarchical order to them. Finally, they talk about Miller being the "pivot" when we start explaining the reason for each exercise and why it applies to skill acquisition. Authors conclude that though the warm=up science for skill acquisition has advanced, we're sill not addressing vocal fatigue in the literature.
Effects of straw phonation... SATB Chorus	Manternac h	Teachers of choral leadership writing for a vocology journal.	A rare look at how straw phonation affects choral singing, as opposed to solo vocal singing.	While the study showed that there was no measurable acoustic difference with straw phonation warm up, the singers did report they perceived improvements in their sound and ease or efficiency of vocal production.

Effects of WU Focused on Mind- Body-Choral Performance	Katada	Authors are writing from a health science research laboratory in Tokyo	Authors examine the effects of mind-body focused warm-ups (including imagery) on a choir, as compared to the more often studies acoustic benefits	Results of the study suggest that singers who engage in stretching, imagery, and other mind- body work have an enhanced experience with respect to expression, relaxed performance (reduction of anxiety) and overall experience.
Effects of WU ...Choral Sound/Replication	Grady	Well known researchers in choral methods and pedagogy writing in an academic environment for a high impact professional journal	This study replicates a previous study investigating acoustic and perceptive measures of the effectiveness of choral warm ups.	This study came to the same conclusions as prior studies. Major points for me include the importance of triangulating results of hard data (acoustic measurements) and qualitative data (perceptive measurements.) Also important is the extensive literature review, once again corroborating my findings above in the analysis of the gray literature.,
Vocal WU Practices and Perceptions	Gish	Interdisciplinary team researching for conference/sympos ium and publishing their results in an high impact professional journal	Pilot study examining the type, duration, and frequency of vocal warm ups in use in the singing community.	A few thoughts: I would like to have sent the data broken down further so that we know which singers were solo, choral, professional, amateur. I would also like to have seen some

				examination as to whether or not singers know *why* they are doing certain warm ups.
What happens during vocal warm up?	Elliot	Leading vocal acousticians writing in 1994 examining the physiological and acoustic effects of warm ups.	This is a paper heavily cited in later research. It's the first of its kind to truly examine the acoustic effects of vocal warm ups.	The technology relied upon to analyze the acoustic phenomenon is now outdated (see LTAS measurements in Gish); however, relies upon the pressure formulas developed by Titze, without whom we wouldn't have a way to calculate vocal pressures. The conclusion is that vocal warm up improves pressure ratios in all subjects, though the examined theory this was due to changes in vocal fold viscosity was not demonstrated. This is the paper that launched a thousand ships, as it is cited as foundational to many of the later studies on VWU efficacy.

Singer and Listener Perceptions of Warm Up	Moorcroft	Practitioner researchers presenting findings in a high impact professional journal	This paper asks what several others have not, which is what are the *listeners* perception of vocal warm up in addition to that of the singer.	Interestingly, one of the perceptive measures of this study includes vibrato as one of the evaluative qualities, and cites "improved vibrato" (more evenly modulated) as one of the outcomes. This makes me wonder about connecting tonal outcomes specific to choral singers compared to vibrato in solo singers; however, I think i can draw from other studies that there are improvements to the perception of tonal outcomes subsequent to VWU
The Effect of Traditional vs SOVTEs on Acoustic Parameters	Duke	Academic cohort study	Comparison of "traditional" vs. SOVTE VWUs	There is no difference in the Singing Power Ratio of these singers in comparing the two types; however, this sample size is very homogenous (all male) and very small (13 people).
Quantifying Sub..Obj..Durations WU	Ragsdale	Cohort study	Pilot study demonstrating the immediate selfbenefit of 5 -10 minute warm up.	This study satisfies my need to have both perceptive and quantitative data in answering the research question. (uses the EASE Scale)

Effective ness of EASE Scale in developing	Marchand	Cohort Study	Examines whether the EASE Scale can be sued in developing individualized warm ups for choirs.	One way to test the cards: use the EASE scale . Maybe one add-on tool for the deck is a warm-up assessment, that would take individual results to help create aggregate scores, give students individual plans, and maybe even warm ups by vocal sections.
Effect of Specific vs. Combined WU	McHenry	Academic Researchers	Looks at whether or not aerobic activity changes effectiveness of VWU	Important for me here: aerodynamic data are added to the methods., beyond perceptive and acoustic data.

Appendix E: Kolb Reflective Journal

Date	Experience	Reflection	Abstraction	Active Experimentation
27-Jul	Completed the outline with word counts. Completed the project workbook, including Gantt and timeline.	This is an important task for me, one that helps me set the pace of the project and identify potential crunch points. With the three week work trip in the middle of the project, time management will be vital.	Next step here is to go through my class notes and drop in comments that highlight concepts and tasks to consider while writing. I am observing that the first two weeks in October are critical. I will likely have	Take time before August 1 (my departure day) to go through my class notes since June and identify key amplifiers I included in my class notes as comments in the outline document. Also before August 1st
27-Jul	I placed five poster sheets categorized by warmup type in the front hallway for students for them to write their favorite warm ups on	As a way of promoting workplace research, this gives me a way to include my students and my studio in the research and design process. I am pondering whether to add my own standard warmups and let students	This is the same framework I have been teaching in my studio for years, and my students know it well by now. One benefit of this idea is that my students will get to see studio-wide what is going on, perhaps starting	These sheets will need to be up until September 15 when I do the re-design of the card deck. I need to inventory/monitor (and photograph) the sheets over the course of the next several weeks
2-Sep	I completed the literature search for information about playing cards.	Since I have no research knowledge about this subject, I need to consider multiple kinds of cards, not just gaming cards. What about using index cards in a learning	The existing peer-reviewed literature falls roughly into three categories: gaming, educational tools, and process facilitation.	I think next steps here after running them through the inclusion matrix is to create a set of codes for this group of references. I can already see three major codes and several subcodes.
6-Sep	Completed reading & coding the playing card source information	This is a complex topic with multiple complex philosophical design solutions driven primarily by the function of the card.	Each category of card has a design history reflected in its use, with several key overlaps (card size, orientation, materials, suits) and several divergent qualities (expansion	I will need to create the first draft prototype (based on advice in one of the papers) and play around with it fairly soon. Color, typeface, iconography, and instructions
7-Sep	Completed the literature search for vocal warm ups	I was rather surprised at the lack of supporting literature in the ACDA journal, and not surprised that the voice journals pointed to the	The choral journal and IJCS are very difficult to search. Working with search terms can be more challenging than one would expect-	I worked with shorter search terms as a way to increase the number of hits. This was somewhat effective.
18-Sep	Completed reading & coding warm up peer reviewed source information	As in past projects, I had to expand my search parameters beyond the research question keywords to get enough source material in the peer reviewed material. This resulted in	All useful articles point to the stratification of pedagogy in warm-ups whether solo or choral, and the importance of motor learning theory in developing approaches to	I will likely need to organize the suits hierarchically, which will require visual cues of some kind, and at least some kind of subcategory that helps identify SOVTE, physiological,
20-Sep	Completed reading and coding the gray literature (primarily books/texts)	One of the noticings coming away from the book/texts is the long chronology of the discussion of WU, including how much more detailed	Key takeaways for me here have to do with the sequencing and type (functional, musical, physiological, SOVTE,	With so much of the literature pointing to the importance and benefit of appropriate sequencing, I will need to ensure that the card suits are
21-Sep	Created matrix of all 52 cards	I am deeply concerned that there will be too many musical examples to create to make this work in the time that I have	I created a *massive* spreadsheet with all 52 cards and the content for their layout, along with a column for the "affect" of the exercise, and one to	It's time to actually create a first draft of these cards, which I hope to do tomorrow! I will use every card stock and print them at home.
	Created prototype (e-version) of cards	I am disappointed that there isn't enough time to *really* go beyond the prototype. The amount of visual design work (iconography, engraving musical examples, color design) is	Using MS Word and Adobe InDesign, created the car layout for each of the 52 cards in such a way that they could be printed with commercially available products (Avery card stock)	I will need to pick 3-5 of the cards to create musical examples for that will replace the "instruction" portion on the back. I did make notes (inserted comments) on the prototype as I
				For consideration/improvement:
				Possibly include a QR code on each card going to an online video example
				Include an icon for each category and possibly subcategory
				Brighter colors require higher contrast text color. Have to soften/pastels base
				Would prefer more visually accessible
				Cards need to be large for more white
				Need to re-edit removing or explaining
				Need consistent nomenclature for

Appendix F: Warm-Up Card Matrix

Category	#	Warm Up Name	Subcategory	Instructions (on the reverse side)	Effect
Body (Stick figure)	1	Body Taps	Brain Gym	Begin at the top of the head, gently tapping your fingers from the crown of your head to the tips of your toes!	Helps activate the brain-body connection (motor learning).
Body	2	Knee Lifts	Yoga	Gently lift one knee while balancing on your other foot, hold for five second, and then switch sides. Do this three times. Hint: place one hand on a chair for balance!	Release of the psoas muscle (breathing and posture).
Body	3	Head and Neck Rolls		Rotate your head toward your shoulder, head, then back around. Remember: soft limits, don't stretch until it hurts!	Release and relaxation of the long muscles of the neck, promoting body alignment and efficiency in breathing.
Body	4	Side Stretches	Yoga	Palms touching above your head, lean to the left while you inhale. Exhale as you come back up. Switch sides.	Release and relaxation of the costal and intercostal muscles, promoting respiratory efficiency.
Body	5	Hip Swivels		With your feet shoulder width apart (directly under your hips) make figure 8's for ten seconds in one direction and ten seconds in the other	Release and relaxation of the hip and abdominal muscles, promoting body alignment and efficiency in breathing.
Body	6	Hokey Pokey		Raise your left hand in front of you just below shoulder height and shake your hand, switch sides. Raise your left foot (use a chair for balance if you need to!) and shake- then do the right foot. Repeat 3 - 5 times, getting faster as you go!	Helps activate the brain-body connection (motor learning), and encourages active proprioception.
Body	7	Shoulder Rolls		Shrug your shoulders once, then roll both shoulders forward five or six times, then backwards. Then roll them opposite to each other, then roll them in the "other" opposite direction!	Helps relax and release the shoulder joints, promoting body alignment and efficiency in breathing.
Body	8	Jaw Release	Massage	Start with your thumbs in the space below your ear at the back of your jaw. Gently rub downward following the jawline until you get to your chin. Do this three times.	Helps relax and release the muscles of the tongue and jaw, and resets the sublingual nerve, hopefully assisting in the release of tongue tension.
Body	9	Ragdoll	Alexander Technique	Standing with feet about shoulder width apart, let the top half of your body fall forward as you exhale, reaching for your toes (remember: soft limits, don't extend to the point of pain!) As you lift your upper body from your hips, inhale and come to a relaxed standing position. Do this three times.	Release and relaxation of the muscles of the back, and helps relate postural alignment with
Body	10	Top to bottom Scan and Release	Mindfulness	With your eyes set on a "soft gaze," inhale as you mentally scan your body from top to bottom, noticing any places you might be tense. As you exhale, imagine you are releasing the tension from that place in your body. Scan three times.	Promotes cognitive ease and relaxation by activating the Default Mode Network.
Breath (wind icon)	11	Beach Balls	Alexander Technique	Standing tall, pretend you are holding a beach ball in front of your body at your hips. As you inhale, imagine the ball getting bigger as your arms expand. As you exhale, push against the imaginary beach ball until it's empty. 3 - 5 times.	Helps develop pacing of breath with the phrase, in addition to sensing the appropriate amount of engagement in the upper body during exhalation.
Breath	12	Half Windmills	Alexander Technique	Place the knuckles of one hand behind you in the small of your back. As you inhale for a count of four, raise your free hand to just about shoulder height. Exhale for eight seconds, lowering your hand to your side as you go. Do this three times, then switch sides!	Pacing of breath, body alignment, and encourages proprioception.
Breath	13	Square Breaths	Flow State	Sitting or standing comfortably with a soft gaze, inhale for four seconds, hold the breath for four seconds, exhale for four seconds, and hold for four seconds. Repeat 3 - 5 times.	Helps calm (deactivate) the prefrontal cortex, engages the Default Mode Network, and increases efficient engagement of the mind-body-breath relationship.

Breath	14	Hook Exercise	Onset	Without phonating (should sound like a whisper), repeat the sound "hoo" four times. On the forth time, ad a "k" on the end (the fourth sound will be the unphonetic word "hook.") Repeat this 5 times.	Encourages coordinated onset with the breath, and allows practice of vowel resonance without phonation encouraging minimal engagement of the vocal tract muscles when shaping vowels.
Breath	15	/s/ - /t/ - /ch/	Articulation	Rhythmically repeat the sounds: /s/-/t/-/s/-/t/-/ch/-/ch/-/ch/ five time in a row, all on one breath!	Encourages consistent flow of breath while articulating consonant sounds/
Breath	16	4/8 Hiss	SOVTE	Inhale through the nose for 4 seconds, and exhale for 8 seconds through a "hiss." Work to keep the pitch of the hiss high and consistently the same.	Encourages the sensation of consistent airflow.
Breath	17	s-s-s-s-sssss (snakey)	SOVTE	Without stopping the breath, rhythmically articulate four "s" sounds in a row, with the fourth "s" about four times as long as the first three.	Encourages efficient breathing mechanics.
Breath	18	long breezy hiss	SOVTE	Making an "s" sound, create crescendos and decrescendos in waves until you need to take a breath. Repeat 3 -4 times	Encourages efficient breathing mechanics.
Breath	19	Cool space in your hand		Holding your hand (palm toward you) about six inches from your face, make five short exhales (as though you were blowing out a candle) creating a cool spot in the palm of your hand.	Encourages efficient breathing mechanics.
Breath	20	Shoo Who?	Articulation	Rhythmically whisper the sounds /shoo/-/foo/-/too/-hoo/ four times, elongating "hoo" on the last time. Repeat 3 - 5 times.	Practices articulation of consonants with forward (unphonated) vowels.
Phonation (sound wave)	21	Buzzy Lips	SOVTE	Deep inhale, and slide from 1 - 5 - 1 while making "buzzy" or "raspberry" lips. (Tip/hack: if you can't buzz your lips, you can place a finger against each side of your mouth to help!) [musical example]	Encourages ease of phonation by increasing intraoral airpressure.
Phonation	22	Tongue Trills	SOVTE	Inhale through the nose, and roll your tongue while sliding up and down at random pitches. Start in the low (chest) voice, and trill upwards into your head voice. Do this 3 - 4 times. [musical example]	Encourages ease of phonation by increasing intraoral airpressure.
Phonation	23	Chewing Noises	SOVTE	Make chewing sounds- mouth closed- high in the voice for 5 - 10 seconds. [musical example]	Encourages ease of phonation by increasing intraoral airpressure.
Phonation	24	Five note slides	SOVTE	Starting in the low (chest) voice, hum 1 -5- 1 sliding from the bottom pitch to the top pitch (portamento). Repeat up 1/2 step each time until just below the upper (head) register. [musical example]	Encourages ease of phonation by increasing intraoral airpressure.
Phonation	25	Bubbas	SOVTE	Starting just below the head register, sing 5 -4- 3-2-1 on the syllable /buh/. Repeat down 1/2 step until at the bottom of your comfortable range. [musical example]	Encourages ease of phonation by increasing intraoral airpressure.
Phonation	26	Hung ah, oo, ee	Onset	Quickly sing the word "hung" on the first scale degree, then portamento (slide) up to the fifth scale degree *while singing the /ng/ sound.* At the top pitch, open to /ah/ and return 5-4-3-2-1 on the vowel. Repeat in rising half steps as long as comfortable (no tongue or larynx tension). [musical example]	Uses the "h" sound to encourage easier onset and encourages efficient vowel placement (resonance).
Phonation	27	Flah flah nee	Functional	On the syllables /flah/-/flah/-/nee/ sing the pitches 1 -3 - 5-4-3-2-1 extending the /nee/ during 5 4 3 2 1.	Used the "f" to encourage vocal flow and the vowels sounds to encourage efficient vowel placement.
Phonation	28	HUMS	Functional	Hum a major third with portamento (1-3-1) and open to "mee" on the final note	Ease of phonation with decreased range while practicing vowel placement.
Phonation	29	Zing Zing Zing	Articulation	Sing the word "zing" once on each note: 5-4-3-2-1-5-1 (whole step increments, descending or ascending)	Uses the "z" sound (voiced consonant) to encourage vocal flow fo
Phonation	30	oo-ee-oo-ee-	Articulation	Sing the syllables: /oo-ee/-/oo-ee/-/oo-ee/-/oo-ee/-/oo-ee/ on pitches 5-4-3-2-1,	Practices vowel articulation and intonation using release of of subglottic pressure (downward scale).

				descending from a comfortable range by 1/2 steps	
Range & Register	31	Dove, Duck, Goose	Mixed Registers	Saying three times in sequence: "Coo-Coo-Coo" high in the voice, then "quack-quack-quack" low in the voice, then "honk-honk-honk" in the middle or mixed voice. Repeat three times	Practices the sensations of vocal registration (head, chest, mix).
Range & Register	32	Woops	Register Practice	High in the voice, say the word "whoop" three times. Breathe & repeat three times.	Practices the sensation of head voice.
Range & Register	33	Sighs	Register Practice	Starting high in the voice (head register) say the word "sigh" as you descend in pitch to the bottom of your range. Repeat three times. (Flip this one on it's head and go from bottom to top!	Promotes unity and ease of registration across rage.
Range & Register	34	Ho, Ha, Ho	Onset	Starting in the low (chest) voice, sing the syllables "Ho-Ha-Ho-Ha- Ho" on 1-3-5-3-1. Ascend in 1/2 step increments into the head voice.	Uses staccato onset assisted by the "h" to easily negotiate the register change while ascending (adding subglottic pressure).
Range & Register	35	Oh How I Love to Sing	Extension	Sing the words "Oh how I love to sing" on the pitches 1-3-5-8-5-3-1 ("love" gets two pitches, 8-5). Repeat rising in 1/2 step increments.	Builds ease in moving through the range (over a registration change).
Range & Register	36	Zeeh-ah-ah-ee	Articulation	"Sliding up legato from 1 ("Zee") to 5 ("Ah; sung staccato), "Ah" again on 5, slide down to 1 ("ee"). Repeat rising in 1/2 step increments.	Combines staccato and legato articulation to stretch the range.
Range & Register	37	Descending Ya Yas	Extension	Sing the syllables "ya-ya-ya-ya-aaaah" on 5-4-3-2-1 (long bottom note). Descend in 1/2 step increments to the bottom of the voice.	Extends the range (downward).
Range & Register	38	My, My, My	Extension	Sing the words "My My My My" on 8-5-3-1. Sing in descending 1/2 step increments.	Extends the range (downward).
Range & Register	39	Laugh, Sob, Sigh	Register Practice	Practicing "laughing" (exaggerated, loud), "ha ha's" low in the voice, then make sobbing sounds "boo hoos" high in the voice, followed by "sighs" (sad laments) from high to low.	Practices registers with higher subglottic airpressure.
Range & Register	40	Shu fa fun	Extention	Sing the syllables "Shu-Fa-Fun-Fun-Fuuun" on pitches 5-8-3-5-1 (long bottom note). Can be done ascending or descending in 1/2 step increments.	Extends the range and practices vowel placement in different registers of the voice.
Intonation & Resonance (Tar	41	Just Swell (messe di voce)	Bel Canto	Sing the syllables "nee-nay-nah-noh-noo" on unison pitch while crescendoing from mezzo piano (nee) to forte (nah) and back down to mezzo piano (noo).	"Joins the registers" while practicing vowel placement and efficiency.
Intonation & Resonance	42	Ki Ke Ki Ke Ki, Ke-Kaw	Articulation	Sing the syllables Kee, Kaw, Kee, Kaw, Kee staccato on pitches 5,4,3,2,1. Repeat descending in 1/2 steps.	Uses staccato onset with velar consonant to practice intonation, range, and registration simultaneously.
Intonation & Resonance	43	Noodles (ne,nae, na, no, noo)	Pitch discretion	Alternating between the pitch and its upper neighbor (whole step), sing "nee", then "ney", "na", "no" and finally "noo," sutaining the last pitch).	Practices discrete pitch change and efficient vowel placement.
Intonation & Resonance	44	Meow Meow	Resonance	Sing the word "meow" once on each pitches: 5,4,3,2,1. Repeat descending in 1/2 step increments.	Practices the sensations of resonant vowel placement.
Intonation & Resonance	45	Gna Gna	Resonance	Sing the word "Gnya" (nasal tone) once each on pitches 5,4,3,2,1. Repeat descending in 1/2 step increments.	Practices the sensations of resonant vowel placement.
Intonation & Resonance	46	Vowel Slides (oo, ah, ee)	Resonance	Slide (portamento) on 1-5-1 first on /oo/ then /ah/ then /ee/, (three times on the same pitch. Repeat rising in 1/2 step increments.	Practices the sensations of resonant vowel placement.
Intonation & Resonance	47	Scale Numbers	Pitch discretion	Sing the numbers 1,2,3,4,5,6,7,8,7,6,5,4,3,2,1 on the corresponding scale degrees. Repeat in 1/2 step increments. Fun tip: turn this one upside down for a change-up!	Practices intonation of scale degrees using words that cue the pitch/scale degree.
Intonation & Resonance	48	Soft Swings	Register Practice	Sing the syllables "nee-ah" sliding from 1 (nee, forte) and decrescendoing to -5 (ah, piano, on the top), then 5,4,3,2,1 on the syllable ah (still piano).	Practices making vowel changes during a dynamic change, improves vowel resonance strategies and practices registration.
Intonation & Resonance	49	Koo-Koo	Articulation	Sing the syllable "koo" on 1-3-5-4-3-2-1. Repeat in 1/2 step increments. Fun tip: change out for	Practices the sensations of resonant vowel placement with pitch change

				Kee or Kay.	
Intonation & Resonance	50	M7M's (mi-ma-ma-mo moo)	Resonance	Sing the syllables "mee-may-mah-moh-moo" on the 5th scale degree, descending 5,4,3,2,1 on moo. Repeat rising in 1/2 step increments.	Practices the sensations of resonant vowel placement with pitch change.
Rubber Ducky 1	51	Improvise Body and/or Breath	Motor Learning, Alignment	Create a warm up of your own that encourages or promotes ease in body alignment or breath engagement for singing.	Uses understanding of functional warmups to create something new and spontaneous
Rubber Ducky 2	52	Improvise Phonation and/or Range	Functional	Create a warm up of your own that encourages or promotes ease in phonation and/or extending singing range.	Uses understanding of functional warmups to create something new and spontaneous