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SCHOOL OF MUSIC

Discovering the Pedagogy and Secrets of Gamification and Game-Based Learning Applied to the Music Theory Classroom

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by

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Abstract

This research project aims to establish the credibility of gamification and game-based learning (GBL) in higher education and online education, specifically for applying digital game-based learning (DGBL) to the twenty-first-century music theory classroom. This research project aims to address the current Education Engagement Crisis, the historical need of engaging students, and adapting the music curriculum to the current technological age. This research project will propose an original digital game concept and framework for teaching music theory core skills and other areas of music-related study in higher education as its contribution to the field and research of music education and digital game-based learning. The proposed game, the *Universe of Music Theory: Music Masters* (UoMT), will be an immersive, engaging, fun, and interactive, online learning-centered game created for the music theory core curricula and designed to address the preferred learning methods of digital natives. This framework may work alongside any music-core program or course as a MIDI lab activity, course-facilitated, or independent supplemental teaching and learning tool. The UoMT will facilitate unique opportunities to teach, reinforce, and assess music theory concepts in a praxial manner that will enable students to practice music-core skills (Music Theory, Keyboard Skills, and Aural Skills) and explore interconnected music-related disciplines (music academia, natural and scientific sound and music phenomena, and psychology of music). What the student learns in class will increase their in-game efficiency and what the student reviews in the game will increase their in-class efficiency.

Keywords: Gamification, game-based learning, digital game-based learning, student engagement, higher music education, music core curricula, supplemental learning tool.

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DGBL – Digital Game Based Learning

GBL – Game Based Learning

MT – Music Theory

SRET – Sight Reading and Ear Training also known as “Aural Skills.”

KBS – Keyboard Skills

ST – Skill Tree

UoMT – The *Universe of Music Theory: Music Masters* is the name of the proposed game concept in Chapter Four. The UoMT is a digital game rooted in MT, KBS, and SRET and explores other interconnected music-related disciplines (i.e., music composition, performance, audiation, music academia, natural and scientific sound and music phenomena, and the psychology of music).

- Natural and Scientific Sound and Music Phenomena refers to subjects such as the following: physics of sound and music; thermoacoustics; cyroceisms; singing sand dunes; thunder and lightning; wind vacuum; sonoluminescence; ultrasound; and infrasound.
- The Psychology of Music refers to subjects such as the following: music and the brain; music therapy; ear anatomy; and psychology.
- Music Academia refers to subjects such as the following: music history, philosophy, pedagogy, education, advocacy, administration, business, and copyright).

CHAPTER ONE: INTRODUCTION

Overview

Chapter One provides an overview of the effectiveness, historical context, and motivational framework of gamification and game-based learning (GBL) through a post-talk review of existing literature.[1, 2] The problem statement addresses the Education Engagement Crisis.[3] The purpose statement proposes that a digital education game rooted in music theory facilitating the applied techniques of the gamification and GBL maintains great potential to be an effective method of capturing students' attention, keeping students engaged, and improving students' motivation for course content, retention rates, test scores, musical competence, and musicianship. The significance of this proposal states that the UoMT (see Chapter Four), a supplemental learning tool, can facilitate engagement in course content, motivate practicing learned material, and develop one's desire to learn music theory in music core students at the collegiate level (ages eighteen to twenty-five). The research questions, hypotheses, and terms establish the rationale for this dissertation.

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[1] Olga S. Gilyazova and Ivan I. Zamoshchanskii, "On Motivational Tools of Gamification in Higher Education: Theoretical Aspect," *Writing Visual Culture* 45, no. 3 (2020): 42-43. doi:10.32744/pse.2020.3.3.

[2] Ibid.

[3] Ibid., 41; Scott Hebert, "The Power of Gamification in Education | Scott Hebert | TEDxUAlberta," TEDxTalks May 7, 2018, YouTube video, 3:26. https://www.youtube.com/watch?v=mOssYTimQwM.

Background

Gamification and Game-Based Learning

According to Mitch Weisburgh and many other scholars and researchers, there is an evident link between how humans learn and how humans play: "Games mirror the way the human mind was designed to learn."[4, 5] Games or "play" are also linked to the development of social and motor skills.[6] In like manner, there is much scholarly support which suggests that music also imitates how children learn and promotes the development of social and motor skills.[7] Therefore, combining two methods (games and music) that mimic the way the human brain is designed to learn, and that develop social and motor skills, would be indicative of a successful teaching and learning methodology. Given the acknowledgment of the efficacy of gamification and game-based learning in engaging and motivating students, many scholars have assisted in the creation of guides and frameworks regarding the proper implementation of gamification and

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[4] Victor Rivero, "Spirit of Play: Game-Based Learning: a Serious Look at Companies 'Gaming the System' for Academic Excellence," *Internet @ schools* 24, no. 4 (2017), 5. https://search-ebscohost-com.ezproxy.liberty.edu/login.aspx?direct=true&db=ehh&AN=125222660&site=ehost-live&scope=site (Accessed: 8 September 2022).

[5] Jeanette Benoit, "The Effect of Game-Based Learning on Vocabulary Acquisition for Middle School English Language Learners" (2017), 38. *Doctoral Dissertations and Projects*. 1376. https://digitalcommons.liberty.edu/doctoral/1376.

[6] Barbaros Bostan, *Gamer Psychology and Behavior*, edited by Bostan, Barbaros. Switzerland: Springer, 2016, 27. doi:10.1007/978-3-319-29904-4.

[7] NAMM Foundation, "Why Learn To Play Music? Advocacy Brochure," https://www.nammfoundation.org/educator-resources/why-learn-play-music-advocacy-brochure-0.

game-based learning.[8, 9] These frameworks can guide future research studies and developments for combining gamification and GBL with the goals of music education for twenty-first-century college students.

There have already been several successful applications of gamification and game-based learning in the classroom environment. Gilyazova and Zamoshchanskii discuss the acknowledged benefits of gamification. They state that gamification can help:

> [D]evelop social practices; improve logical reasoning and critical thinking skills; gain cognitive skills; improve students' concentration and attention levels; develop complex thinking and strategic planning skills; support multidisciplinary learning; enhance motivation toward learning; develop digital literacy; deepen communicative, creative, and recreational skills; encourage students to play an active role in the learning process; support active learning, experimental learning, and problem-based learning; support team cooperation; and improve the emotional climate in the group.[10]

Gamification expert Sebastian Deterding acknowledges the benefits of gamification and GBL by suggesting that the gaming industry's enticing power, which engages millions of players worldwide motivating them to allocate countless amounts of time and money performing menial

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[8] Hebert, "The Power of Gamification," 11:06; Zoltan Virag, "Music Education: Collaborative Student Driven Learning: Zoltan Virag at TEDxWestVancouverED," TEDx Talks, June 24, 2013, YouTube video, 7:33. https://www.youtube.com/watch?v=CFFrT8xqwwk; Luis Enrique Espinosa, "Gamification Strategies for Music Educators: An Online Continuing Education Course," (2020), 34. *Masters Theses*. 698. https://digitalcommons.liberty.edu/masters/698.

[9] Luis Enrique Espinosa, "Gamification Strategies for Music Educators: An Online Continuing Education Course," (2020), 34. *Masters Theses*. 698. https://digitalcommons.liberty.edu/masters/698.

[10] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 43; Josephine M. Randel et al. "The Effectiveness of Games for Educational Purposes: A Review of Recent Research," *Simulation & Gaming* 23, 3 (1992): 265. https://doi.org/10.1177/1046878192233001.

tasks, can be used for educational purposes.[11] In the context of online learning, gamification and digital game-based learning (DGBL) can also help online students, who already feel alone and isolated, feel connected to their peers and professors by facilitating a sense of community, online presence, teamwork, and competition.[12] While previous research examines the application of gamification and game-based learning in K-12 education, little research exists regarding fun and engaging music-theory-based learning games for college students, let alone *online* college students.[13]

Many scholars and researchers admit that in 2017, the study of gamification and game-based learning was in the "infancy stage of research" and that further research was required to determine the full potential of game-based learning and gamification.[14] Abdul and Felicia state that for educators to acquire more conclusive results of GBL, they must more fully understand the links between learning and how games engage their players.[15] There is evidence that these methods (gamification and GBL) maintain great potential to engage, motivate, and increase students interest in course material.[16] Piñero Charlo et al. state that games are capable of

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[11] Sebastian Deterding, "Gamification: Designing for Motivation," *Interactions* (New York, N.Y.) 19, no. 4 (2012): 14. doi:10.1145/2212877.2212883.

[12] Jabbar Abdul, Azita Iliya and Patrick Felicia. "Gameplay Engagement and Learning in Game-Based Learning: A Systematic Review," *Review of Educational Research* 85, no. 4 (2015): 764. https://www-jstor-org.ezproxy.liberty.edu/stable/pdf/24753028.pdf?refreqid=excelsior%3A56842fc8b9baf993472119a74c8ad256&ab_segments=&origin=&acceptTC=1.

[13] Aaron Chia Yuan Hung, "A Critique and Defense of Gamification," *Journal of Interactive Online Learning* 15, no. 1 (Summer 2017): 62. https://search-ebscohost-com.ezproxy.liberty.edu/login.aspx?direct=true&db=ehh&AN=123710949&site=ehost-live&scope=site.

[14] Ibid.

[15] Abdul, Iliya, and Felicia, "Game-Based Learning," 741.

[16] Ibid., 740.

engaging students with different modes or styles of learning and that games can inspire creativity.[17]

Recent literature demonstrates the connection between gamification, game-based learning, and intrinsic motivation.[18] Scholars and researchers acknowledge that games have become increasingly prevalent in today's society, especially with the COVID-19 pandemic and the need for online learning.[19, 20] Gilyazova and Zamoshchanskii state that despite the emergence of the digital age in modern education, the problem of student engagement in the field of education still exists.[21] The responsibility of all educators is to ensure that their students can grow in their knowledge of course material, engage in discussion, apply their comprehension of course material, and hopefully mature in character and understanding as well-adjusted human beings too. These desired results depend upon keeping students engaged with course material.

Modal Learning

A research survey conducted in Thailand examined 348 music-school students' preferred learning methods to increase student satisfaction and efficacy. According to the VARK system,

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[17] José Carlos Piñero Charlo, Nadja Belova, Eduardo Quevedo Gutiérrez, Alberto Zapatera Llinares, Elena Arboleya-García, Jakub Swacha, Paula López-Serentill, and Enrique Carmona-Medeiro. "Preface for the Special Issue "Trends in Educational Gamification: Challenges and Learning Opportunities," *Education Sciences* 12, no. 3 (2022): 4. https://go.openathens.net/redirector/liberty.edu?url=https://www-proquest-com.ezproxy.liberty.edu/scholarly-journals/preface-special-issue-trends-educational/docview/2642402779/se-2.

[18] Rafael Molina-Carmona and Faraón Llorens-Largo, "Gamification and Advanced Technology to Enhance Motivation in Education." *Informatics (Basel)* 7, no. 2 (2020): 4.

[19] Aaron Chia and Yuan Hung, "A Critique and Defense of Gamification," 69.

[20] Espinosa, "Gamification Strategies for Music Educators," 34.

[21] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 41

there are four main learning methods: visual, aural, reading/writing, and kinesthetic (VARK).[22] Gamification and GBL can appeal to all four modes of learning and any combination of modal learning (VA, AK, VRK, etc.).[23] This is practical and significant in the education environment because knowing a student's preferred learning method and facilitating teaching methods that coincide with this preferred learning method "may help educators identify and solve learning problems among students, thus helping their students to become more effective learners."[24]

The utilization of multimodal instruction (VARK) may also manifest as physical utilization. For example, with the emergence of the digital age and the commonplace technology found among classroom (and most all of society) today, the "old ways" of teaching utilizing only papers, writing utensils, and in-person lectures may be modernized for the inclusion of digital learning technology. Lotherington and Jenson state that due to the changing nature of education from paper to lectures to screens and monitors, education would benefit from incorporating different audial and visual modes of learning into the classroom environment.[25] Gamification and GBL provide several opportunities to modernize education and incorporate multi-modal learning.

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[22] Anchalee Tanwinit, and Wichian Sittiprapaporn, "Learning Styles of Undergraduate Musical Students Attending Music College in Thailand," *Revista electrónica de LEEME*, no. 25 (2010): 149. https://search-ebscohost-com.ezproxy.liberty.edu/login.aspx?direct=true&db=asn&AN=55467345&site=ehost-live&scope=site.

[23] Tanwinit, and Sittiprapaporn, "Learning Styles of Undergraduate Musical Students," 156.

[24] Ibid.

[25] Heather Lotherington and Jennifer Jenson, "Teaching Multimodal and Digital Literacy in L2 Settings: New Literacies, New Basics, New Pedagogies," *Annual Review of Applied Linguistics* 31 (03, 2011): 227. https://go.openathens.net/redirector/liberty.edu?url=https://www-proquest-com.ezproxy.liberty.edu/scholarly-journals/teaching-multimodal-digital-literacy-l2-settings/docview/887087164/se-2.

Theoretical Framework

Gamification, game-based learning, and digital game-based learning provide the theoretical framework for this project and provide a lens for examining music education. Gamification, GBL, and DGBL as core concepts of this study, may provide effective methods that address the Education Engagement Crisis (see Problem Statement and Chapter Two Part Three) in not only the collegiate-levels music education, but perhaps across many levels of education (K-12) and music-related disciplines of study (music academia, natural and scientific sound and music phenomena, and the psychology of music) as well. Many scholars agree that all levels of institutions may utilize gamification, because gamification makes learning fun and enjoyable.[26] Researching gamification, GBL, and DGBL yields three connecting themes: one, game thinking; two, motivation (intrinsic and extrinsic); and three overlapping benefits of student engagement, community, and critical thinking. These are the main themes that this project examines, explores, and applies in the form of an original game concept, the *Universe of Music Theory: Music Masters* (UoMT), rooted in music theory and designed for, but not limited to, college students (ages eighteen to twenty-five). In Chapter Four, the UoMT applies many of the tools (mechanics, dynamics, aesthetics, and psychology) utilized in the gaming industry to engage players while finding ways to mitigate or circumvent the mental and physical dangers (unhealthy addictions, obsessions, gaming disorder, games as an escape, and games as a waste of time) found in the traditional world of games. In this way, students of all ages, academic institutions of all grade levels, and players of all backgrounds may be able to enjoy the game and

[26] Molina-Carmona and Fara Llorens-Largo, "Gamification and Advanced Technology," 7.

learn music-core concepts (MT, KBS, and SRET) in a fun, engaging, and healthy digital learning environment.

Problem Statement

The current state of education is facing an engagement crisis: "an increasing lack of student engagement and growing disenchantment, manifesting itself in lower rates of course completion and persistence to graduation."[27] If this crisis is not resolved, then students of all ages and education levels may suffer at least in part from a lack of engagement in course material. The lack of student engagement will inevitably result in poorer education, student experiences, and a worse future for America and the world. As documented in the presented literature, gamification and game-based learning maintain the potential to effectively capture students' attention, engage students, motivate students, promote a fun learning environment, and develop essential learning skills.[28, 29, 30] Given the importance of education, many students may benefit greatly from these learning methods if applied correctly. In conclusion, the problem that this dissertation aims to address is the lack of student engagement and motivation for music theory students at, but not limited to, the collegiate level (ages eighteen to twenty-five).

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[27] Kevin Bell, *Game On!: Gamification, Gameful Design, and the Rise of the Gamer Educator*, Baltimore: Johns Hopkins University Press, 2017. Accessed September 4, 2022, 7. ProQuest Ebook Central.

[28] Deterding, "Gamification: Designing for Motivation," 14.

[29] International Workshop on Social, Semantic, *Higher Education for All from Challenges to Novel Technology-Enhanced Solutions: First International Workshop on Social, Semantic, Adaptive and Gamification Techniques and Technologies for Distance Learning, HEFA 2017, Maceió, Brazil, March 20-24, 2017, Revised Selected Papers*, Cham, Switzerland: Springer, 2018, Preface VI. https://doi.org/10.1007/978-3-319-97934-2.

[30] Medeiro Lloret and Fernando Lloret, *Basel: MDPI - Multidisciplinary Digital Publishing Institute*, 2022, 4. 10.3390/books978-3-0365-3539-5.

Purpose Statement

This dissertation proposes a music-theory-based digital game concept, the UoMT, that aims to facilitate for students, of all ages and educational levels, a desire to learn, an increase in course retention, and a review of music theory concepts throughout the academic school year and over the summer break. This project utilizes a post-talk review of existing qualitative, quantitative, and mixed-methods case studies, correlational research, and historical research regarding GBL, gamification, and the psychology behind why games are fun. The review methods of gathering qualitative and quantitative data work well because case studies, correlational research, and historical research regarding the pedagogy and practice of gamification and game-based learning already exist. However, there remains a need for research regarding how this pedagogy (gamification, GBL, and DGBL) can apply directly to the music theory classroom, especially the online music theory classroom of higher music education. This project aims to explore, design, and apply game concepts, features, and mechanics directly to a digital game rooted in music theory.

Significance of the Study

As established by the predecessors of music education from the Tanglewood Symposium in 1967 and set forth by Michael George, previous executive director of the Wisconsin Music Educators Association and president of the North Central Division of the Music Educators National Conference (MENC, now known as the National Association for Music Education NAfME) in the year 2000, this project addresses the following challenge, “Do not predict the

future. Invent it!"[31] The potential implications of the findings of this project are significant because they aim to invent the future of music education and directly address the Education Engagement Crisis.[32, 33] Due to increasing prevalence of technology, education is facing a decline in student engagement and teaching methods are becoming less relevant to students. A lack of student engagement in the classroom may promote summer learning loss.[34] Therefore, the gamification and GBL concepts are of great significance to these issues. Gamification and GBL can be effective at increasing student engagement in the classroom and at relating course material to the cultural context of the twenty-first-century college student.

In addition to the standard music theory core classes, the UoMT aims to cross the educational borders into other interconnected and music-related disciplines (music composition, performance, audiation, music academia, natural and scientific sound and music phenomena, and the psychology of music). Through a praxial method of application, students and players alike will incorporate their music theory (MT), keyboard skills (KBS), and sight-reading and ear training (SRET or aural skills), to play the UoMT. The inclusion of music theory core classes (MT, KBS, and SRET) is significant because these courses form the very foundation upon which

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[31] June Hinckley, "Why Vision 2020?: The Philosophical Importance of Planning for the Future Cannot be Underestimated. Vision 2020 Focuses on the Future, as the Tanglewood Symposium did in the 1960s." *Music Educators Journal* 86, no. 5, (2000): 25. https://doi.org/10.2307/3399631.

[32] Hebert, "The Power of Gamification," 2:37.

[33] David M. Quinn and Morgan Polikoff, "Summer Learning Loss: What Is It, and What Can We Do About It?," Brookings.edu, September 14, 2017. https://www.brookings.edu/research/summer-learning-loss-what-is-it-and-what-can-we-do-about-it/.

[34] Jordan E. Montana Richards, "Making Music Theory Fun," (2022), *Masters Theses*, 914, 7-8. https://digitalcommons.liberty.edu/masters/914.

students develop their musicianship at the collegiate level.[35] The inclusion of the music business is significant because researchers claim it is important for developing twenty-first-century musicianship.[36] The inclusion of music history is significant because many pieces from the common-practice period are studied and revered in music education.[37] The inclusion of performance lesson aspects is significant because all music majors maintain a primary instrument and some music majors may be interested in learning an additional instrument. The inclusion of other music-related disciplines of study showcases the relationship between sound and music, nature, and the human brain. This understanding of how these concepts connect may lead one to consider the possibility of intelligent design.

The gameplay in the UoMT aims to facilitate and maintain a form of intrinsic and extrinsic motivation for students with a heavier focus on developing intrinsic motivation.[38] While playing, students will be reinforcing what they have previously learned, are currently learning, and what they will be learning. The UoMT aims to provide a fun, motivating, and engaging digital learning environment for students to interact not only with music theory concepts, but also with each other. If successful, the implications of this project maintain the potential to

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[35] Michael R. Callahan, "Teaching and Learning Undergraduate Music Theory at the Keyboard: Challenges, Solutions, and Impacts," *Music Theory Online* 21, no. 3 (09, 2015), http://ezproxy.liberty.edu/login?qurl=https%3A%2F%2Fwww.proquest.com%2Fscholarly-journals%2Fteaching-learning-undergraduate-music-theory-at%2Fdocview%2F1752885241%2Fse-2.

[36] Helena Gaunt and Heidi Westerlund, *Expanding Professionalism in Music and Higher Music Education: A Changing Game*, Taylor & Francis, 2021, 42. https://directory.doabooks.org/handle/20.500.12854/70836.

[37] Sarah Marlowe, "A Taxonomy for Teaching Music Theory: J. S. Bach and Lessons in Invertible Counterpoint," *Bach* 49, no. 2 (2018): 387. http://ezproxy.liberty.edu/login?qurl=https%3A%2F%2Fwww.proquest.com%2Fscholarly-journals%2Ftaxonomy-teaching-music-theory-j-s-bach-lessons%2Fdocview%2F2306778457%2Fse-2%3Faccountid%3D12085.

[38] Molina-Carmona and Llorens-Largo, "Gamification and Advanced Technology," 4.

benefit music students of all ages and grade levels, as well as professors and institutions worldwide.

Research Questions

Research Question One: How can gamification, GBL, DGBL and the secrets of the gaming industry (i.e., what makes games so addicting and fun to play?) be applied to the online or in-person classroom and yield academic results?

Hypothesis One: The utilization of gamification, GBL, DGBL, and the techniques of the gaming industry (i.e., what makes games so addicting and fun to play?) can be applied to the online or in-person classroom and yield positive academic results by serving as a supplementary learning tool which facilitates cultural relevance, course retention, student efficacy, growth as musicians, engagement and motivation for learning and reviewing course material.

Research Question Two: What are some examples of music-theory-based games that can help or maintain the potential to help students of all ages and levels of education, or specifically online college students, achieve self-growth in their musicianship, application, and retention of music theory?

Hypothesis Two: Digital music-theory-based games (i.e., *Quaver, Seesaw, Kahoot!, and* the UoMT,) maintain great potential to facilitate growth in musicianship, application, and retention of music-core concepts for students of all ages and levels of education.

Research Question Three: Do "good addictions" exist? If "good addictions" do exist, can they be used to positively affect student learning outcomes despite students maintaining a "good addiction" to a digital game-based form of learning?

Hypothesis Three: Good addictions do exist (i.e., learning, exercise, reading, and Bible study). The pedagogical implications from good addictions to a digital game-based form of learning maintain the potential to positively affect student learning outcomes through fun, engaging, and intrinsically motivating learning methods and environments that assist in facilitating growth in musicianship, course retention, and combatting summer learning loss.

To answer the proposed research questions via the outlined research method and approach existing literature, as guided by qualitative, quantitative, and mixed-methods data collection defined by Creswell and Creswell publications (national education documents, scholarly books, scholarly journals, trade journals, and magazine articles, newspaper articles,

commentaries, educational materials, and curricula such as books and websites, sheet music, and audio and video recordings), has been collected and examined for informative details, including: quantitative results, qualitative feedback from students, definitions, perspectives, ideologies, frameworks, and implications that define the concepts of gamification, GBL, and DGBL in education and how these concepts might impact music involvement, behavioral patterns, and student engagement and efficacy.[39, 40] The gathered materials of gamification, GBL, and DGBL were also examined within the structure of in-person and online learning environments to understand how these learning methods may direct the framework and the future of online collegiate-level music theory education.

The examination and discussion of the sources above establish the documented directions, goals, and motives that have guided educators in public education toward establishing gamification, GBL, and DGBL in education. These sources facilitate the examination and discussion of gamification, GBL, and DGBL from a pedagogical perspective, concerning the implications of using digital game-based learning in the online college music theory classroom (see Chapter Two). The collection and examination of this material serves to establish a strong foundation for directing this study toward comprising an understanding within the literature of whether the online collegiate-level music theory education structure benefits from the inclusion of digital game-based learning.

After establishing an educational and historical foundation for the credibility of gamification and game-based learning, this project will further explore the benefits and concerns

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[39] John W. Cresswell and J. David Creswell, *Research Design Qualitative, Quantitative, and Mixed Methods Approaches*, Indephedently, Kindle Edition, 243.

[40] Lloret, *Basel*, 4-5.

of these learning approaches (gamification, GBL, and DGBL) in the educational setting. This dissertation aims to utilize methods, approaches, and features that have proven to be beneficial and effective while circumventing the methods, approaches, and features that were proven ineffective or detrimental to providing positive student learning outcomes.[41]

Definition of Terms

Active Learning – Active Learning is "generally defined as any instructional method that engages students in the learning process. Active learning requires students to do meaningful learning activities and think about what they are doing."[42]

Blended Learning – Blended Learning (BL) is defined as, "the integration of face-to-face and online instruction."[43]

Digital Game-Based Learning (DGBL) – DGBL maintains the same principles of GBL only pertaining to digital games instead of physical games (i.e., in-person board or card games).

Digital Games – Any video game that can be played on a computer, phone, tablet, or other technological device.

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[41] Timothy Patrick Gibson, "Designed for Play: A Case Study of Uses and Gratifications as Design Elements in Massively Multiplayer Online Role-Playing Games" (2008), *Masters Theses*, 29, 12. https://digitalcommons.liberty.edu/masters/29.

[42] Michael Prince, "Does Active Learning Work? A Review of the Research," *Journal of Engineering Education* (Washington, D.C.) 93, no. 3 (2004): 223. https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/does-active-learning-work-review-research/docview/217960253/se-2.

[43] Charles Dziuban, Charles R. Graham, Patsy D. Moskal, Anders Norberg, and Nicole Sicilia. "Blended Learning: The New Normal and Emerging Technologies: Revista De Universidad y Sociedad Del Conocimiento." *International Journal of Educational Technology in Higher Education* 15 (2018): 1. https://doi.org/10.1186M1239-017-0087-5.

Education Engagement Crisis – The Education Engagement Crisis also known as the "Student Engagement Crisis," has been plaguing education since at least 1963. This phenomenon of a lack of student engagement occurs throughout K-12 and collegiate institutions.

External Motivation – External motivation "is influenced by environmental and external factors, such as rewards, pressure, or punishment."[44]

Flow (Motivational) Theory – "The flow theory is another motivation theory explaining the appeal of games in education. The flow is 'the holistic sensation present when we act with total involvement.'"[45]

Game-based Learning (GBL) – Game-based learning uses the principles and psychology of games and game mechanics, game thinking, and game design to reach learning objectives.

Game Thinking – Game Thinking is defined as one's ability to experience selflessness, voluntariness, freedom, mystery, markedness, competition, and cooperation.[46]

Gamification – According to leading gamification expert Karl M. Kapp, gamification "[uses] game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems."[47]

Intrinsic Motivation – "Intrinsic motivation, where the inspiration for performing an action can be found in the action itself, represents the most self-determined behavior regulation."[48]

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[44] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 45.

[45] Ibid., 46.

[46] Ibid.

[47] Ibid., 44.

[48] Karl M. Kapp, *The Gamification of Learning and Instruction: Game-Based Methods and Strategies for Training and Education*, San Francisco: Pfeiffer, 2012, 46. https://ebookcentral.proquest.com/lib/liberty/reader.action?docID=821714.

Musicianship – Musicianship is "musical knowing" of any, various, or all kinds.[49]

Self-Growth – Self-growth is used and defined, in and for the purposes of this dissertation, as the improvement between the level of one's musicianship at the beginning of their music education (formal or informal) and the level of their current or future musicianship.[50]

Summer Learning Loss (SLL) – A phenomenon which occurs during the time between spring and fall terms of the academic year wherein students are not in school and consequently do not retain some or all of what they learned in school.

Summary

This chapter has identified its central concepts as gamification, game-based learning (GBL), and digital game-based learning (DGBL). This chapter has provided background knowledge regarding the potential and efficacy of these concepts within the educational environment. These concepts will be used as the framework for this dissertation. This project aims to propose a digital game concept, the *Universe of Music Theory*, rooted in music-core concepts (MT, KBS, and SRET) and other music-related areas of study (music academia, natural and scientific sound and music phenomena, and the psychology of music) for, but not limited to, in-person and online college students (ages eighteen to twenty-five) with the potential to be used by students of all ages and education levels. The significance of this project includes providing a fun and engaging method for music theory students to practice, review, and study core material, which has great potential to improve student musicianship, retention, comprehension,

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[49] David J. Elliot, *Music Matters: A Philosophy of Music Education*, (Cary: Oxford University Press, 2015), 193; Ibid., 196.

[50] Bennett Reimer, *Seeking the Significance of Music Education: Essays and Reflections*, (Lanham: R&L Education, 2009), 309.

engagement, motivation, and nurture in students a desire to learn music theory. The UoMT sets the stage for future research regarding the measurement of test scores, retention, student satisfaction, and motivation, to be conducted on music theory students who play the UoMT (the experimental group) and students who do not (the control group).

To clarify, the goal of this dissertation is to provide a fun, engaging, and motivating music-theory based game concept, not test the effectiveness of the UoMT. The efficacy assessment and experiments may occur under future published studies once the game concept has been developed. The evidence that testifies to the efficacy of the game concept will be established in the form of post-talk reviews of existing literature and research already conducted on gamification, GBL, and DGBL in the general fields of academia, higher education, and the music theory classroom either online or in-person.

CHAPTER TWO: LITERATURE REVIEW

Part one of this literature review (Game World) will establish the classroom-assisting factors (the fun factor, modal learning, establishing connections, and blended learning) of gamification and game-based learning (GBL), the historicity of gamification and GBL as legitimate teaching strategies, seek to understand the benefits of gamification and GBL, discuss the principles of game design, acknowledge existing and successful DGBL applications and software, and examine the secrets of the gaming industry through an analysis of answering the question, "Why are games fun?" Part two of this literature review (Education Theory) will highlight the issue of student engagement and examine how GBL already exists in and can be facilitated through four modern educational theories (modal learning, active learning, self-determination theory, and flow theory) and pedagogies (Carabo-Cone, Gordon's MLT, Orff, Suzuki, and Kodály). Part three of this literature review (The 21st-Century Digital Classroom) will address the practicality of DGBL within the cultural context (games, technology, and the internet) of the twenty-first-century digital classroom. To view the addressed issues and benefits of the *Universe of Music Theory* (UoMT) (see Chapter Four) from Chapter Two, please see Appendices B and C.

Part One: Game World

Gamification & GBL

According to Liberty University, "retention is vital for a thriving university and all the programs they offer."[51] Therefore, any learning strategy that possesses the potential to maintain students' attention, keep students engaged, and instill a desire to learn, and by extension continue taking courses at the same institution, ought to be considered. Gamification "[utilizes] game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems."[52] Game-based learning uses the principles and psychology of games and game mechanics, game thinking, and game design to reach learning objectives. The following five subsections or "factors" will demonstrate how Gamification and GBL offer great potential in maintaining students' attention, facilitating student engagement, and instilling within students a desire to learn.

The Fun Factor

In the world of education and universities, "standardization is a path that can lead to losing uniqueness in chasing the ratings."[53] However, making music theory fun may give any university an unique feature that may not be present in many other universities. The evidence for "fun" being a unique feature not present in many universities is found in the progression of school from elementary to middle school to high school already being a change from fun to

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[51] Liberty University, "University and Departmental Structure," (presentation in MUSC845 at Liberty University, Lynchburg, VA), Slide 9.

[52] Gilyazova, and Zamoshchanskii, "Gamification in Higher Education," 44.

[53] Daniel W. Wheeler, *Servant Leadership for Higher Education: Principles and Practices*, (San Francisco, CA: Wiley Professional Development, 2011), 132. https://mbsdirect.vitalsource.com/books/9781118181379.

boring. Evidence of this missing "fun factor" is also found in the worldwide Education Engagement Crisis where students (even college students) are too bored in class to stay engaged in course material.[54, 55, 56] These trends suggest that many college classrooms are missing the "fun factor."

Evidence for the efficacy of the "fun factor" is prevalent in the psychological experience of the "time flies" theory. Where the more enjoyable the experience, the faster time is perceived to go by.[57] The practicality of making music theory fun resides in the feature of "having fun." As demonstrated in Chapter One, not only is there a link between learning, music and play, but having fun and playing games are concepts and methods that maintain great potential to capture students' attention and keep them engaged.[58]

Scholars support the notion of filling in the gap of what the educator was missing during their learning experience or how their process could have been advanced is explored.[59] Guajardo et al. state that "play is an important aspect of work."[60] GBL and the concepts of fun and intrinsic motivation are often missing from many higher education music curricula. Zoltan Virag and

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[54] Zachary Jason, "Bored Out of Their Minds," *Harzard Ed. Magazine* (2017). https://www.gse.harvard.edu/news/ed/17/01/bored-out-their-minds.

[55] Hebert, "The Power of Gamification," 3:26.

[56] Gilyazova, and Zamoshchanskii, "Gamification in Higher Education," 44.

[57] Aaron M. Sackett, Tom Meyvis, Leif D. Nelson, Benjamin A. Converse, and Anna L. Sackett, "You're Having Fun When Time Flies: The Hedonic Consequences of Subjective Time Progression," *Psychological Science* 21, 1, (2010): 111–17. http://www.jstor.org/stable/41062172.

[58] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 43.

[59] Guest Expert, "5 Habits of Effective Music Teachers," *Musical U*, (Last visited on November 24, 2022). https://www.musical-u.com/learn/5-habits-of-effective-music-teachers/.

[60] Miguel A. Guajardo, Francisco Guajardo, Christopher Janson, Matthew Militello, *Reframing Community Partnerships in Education: Uniting the Power of Place and Wisdom of People*. London; New York;: Routledge, Taylor and Francis, (2015): 114. doi:10.4324/9781315732640.

Scott Hebert are music teachers and gamification researchers who showcase both the impact of gamification and GBL in the music classroom and impact of a lack of fun in modern classrooms. Another testament that GBL is not common in many classrooms, comes from Scott Sterling who highlights that in 2015, games were used by forty-eight percent of teachers nation-wide.[61]

Christopher Small argues that "music is not a thing. It is an action."[62] This action of music is something that one can engage in (i.e., performing, listening, composing, dancing). Therefore, a digital game rooted in music theory would not take away from the value of music education. Small's argument leads to the following understanding: engaging in music (through any means even by playing a digital game), facilitates the learning and development of one's musicianship.

Randel et al. states that, due to the popularity of digital games among students and the innate ability of digital games to capture the attention of millions of players, many researchers, scholars, and educators have wondered whether or not the aspect of play "could be combined with instruction to enhance learning."[63] According to leading gamification expert Karl Kapp, gamification is the process or application of "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems."[64] Technology allows for digital game-based learning, which is indicative of intrinsic motivation. The act of

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[61] Scott Sterling, "Teachers Report Sharp Growth in Game-Based Learning," *District Administration* 52, no. 7 (July 2016): 50. https://search-ebscohost-com.ezproxy.liberty.edu/login.aspx?direct=true&db=a2h&AN=116571521&site=eh ost-live&scope=site.

[62] Virag, "Music Education," 1:59.

[63] Randel et al. "Games for Educational Purposes," 261; Raed S. Alsawaier, "The Effect of Gamification on Motivation and Engagement," *The International Journal of Information and Learning Technology* 35, no. 1 (2018): 57. https://www.emerald.com/insight/content/doi/10.1108/IJILT-02-2017-0009/full/html.

[64] Gilyazova and Zamoshchanskii "Gamification in Higher Education," 44.

playing the game grants players motivation and a desire to continue playing or in this case learning.[65]

Campillo-Ferrer et. al found that the online game-based learning platform, *Kahoot!*'s ludic approach (playful, fun, or game-based) encourages creativity, innovation, and student engagement.[66] Campillo-Ferrer et. al suggest that "further research and information on the application of these innovative proposals [(digital) game-based learning] in higher education contexts is … needed to better understand and adapt these ludic [playful/game-based] strategies to the main interests and demands of students."[67]

Preferred Learning

Games maintain the potential to appeal to a variety of learning modes and preferred learning methods, including visual, audible, reading-writing, and kinesthetic (VARK) methods. Research suggests that appealing to a student's preferred learning method improves student satisfaction, motivation, and efficacy.[68] According to Conway, student assessment methods that help educators understand students' prior knowledge, experience, and interest in music education should be fun musical activities that do not "give the feeling of a 'test' to students."[69,70] Therefore, this project posits that a digital music theory-based game may be an optimal strategy to discover a student's prior knowledge, experience, and interest in music theory. The Universe

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[65] Gilyazova and Zamoshchanskii "Gamification in Higher Education," 46.

[66] Campillo-Ferrer et. al, "Gamification in Higher Education," 2.

[67] Ibid., 3.

[68] Anchalee, and Sittiprapaporn. "Learning Styles of Undergraduate Musical Students," 151; Ibid., 157.

[69] Colleen M. Conway, *Teaching Music in Higher Education*, (Oxford University Press, 2020**]**), Kindle Edition, 135.

[70] Ibid., 144.

in Chapter Four will involve a segment after or during the tutorial that assesses the player's prior knowledge of MT, KBS, and SRET.

Establishing Connections

Conway states that undergraduate students "need professors to help them make connections between all of the music courses they are taking."[71] Gamification and GBL provide multiple modes (VARK) and methods of learning that can set goals and cross-link material from different music-related courses (music core skills, music academia, natural and scientific sound phenomena, and the psychology of music) together, and therefore are capable of assisting in forming connections between all music subjects and in accordance to the student's preferred learning modes.[72]

Conway also discusses the importance of learner-centered pedagogy and moving away from the transmission model of teaching. This requires the educator to create an open classroom environment where students feel comfortable asking questions, engaging in dialogue, and learning.[73] Facilitating more connections between students and course content may result in increased student comfort, dialogue, engagement, and learning.

Conway suggests that engaging in a collaborative, hands-on project will result in a deeper understanding of theory and practice.[74] Therefore, typical multiplayer (digital) games, which are collaborative and hands-on projects will result in a deeper understanding of music theory and music practice and (through modal learning, active learning, and student-centered pedagogy)

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[71] Conway, *Music in Education*, 205.

[72] Ibid.

[73] Ibid., 121.

[74] Ibid., 124.

may be able to facilitate a more relatable connection between students and course content than the traditional method of teaching.

Blended Learning

According to the Online learning Consortium, in 2003, eighty-five percent of all higher education institutions offered a minimum of one fully online or blended learning course.[75,76] Dziuban et al. showed that Blended Learning (BL) promotes and improves student success, satisfaction, and a sense of community.[77] Online technologies can "increase access to nontraditional and underserved students by bringing a host of educational resources and experiences to those who may have limited access to on-campus only higher education."[78]

Dziuban et al.'s study also identified three aspects of education that determine an excellent educational experience: "a clear establishment and progress toward course objectives, creating an effective learning environment, and the instructors' effective communication."[79] According to Dziuban et al. the flexibility of BL "allows us to maximize many positive education functions."[80]

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[75] I. Ellaine Allen and Jeff Seaman, "Sizing the Opportunity: The Quality and Extent of Online Education in the United States," (2003), 2. Retrieved from http://files.eric.ed.gov/fulltext/ED530060.pdf.

[76] Dziuban et. al., "Blended Learning," 1.

[77] Ibid., 3.

[78] Ibid., 4.

[79] Ibid., 11.

[80] Ibid., 13.

Historical Overview of Gamification and GBL

According to Lloret, the history of playing games for the purpose of intellectual challenges dates back to the beginning of civilization.[81] Gamification has been used in the professional sphere since at least 1961 to facilitate employee motivation, client engagement, and awareness of information.[82] First-person shooter games (i.e., *America's Arm*y) were used to promote the United States army in 1999.[83, 84] In 2005, companies utilized gamification to facilitate customers loyal and engagement with their brands, products, and services (i.e., points rewards cards).[85] According to Gilyazova and Zamoschanskii, "the scientific research of gamification as an interdisciplinary concept" dates back to 2010.[86] The first gamification summit, called "GSummit," was held in 2011 which brought together "more than 400 professionals interested in discussing gamification."[87] Jane McGonigal and Sebastian Deterding introduced gamification to the scholarly world of academia and research in 2011.[88]

Game-Based Learning (GBL) has been used vocabulary acquisition since 1971 and has scholarly roots in education as far back as 1981.[89] Specifically GBL has been utilized with

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[81] Lloret, *Basel*, 1.

[82] Alok Pandey, "A Brief History of Gamification," *Crossroads (Association for Computing Machinery)* 24, no. 1 (2017): 13. https://dl-acm-org.ezproxy.liberty.edu/doi/10.1145/3123774.

[83] Ibid.

[84] Jacqueline M. Hames, "Americas Army – Army Values and Plenty of Action," *U.S. Army*, (published on August 21, 2009). https://www.army.mil/article/26405/americas_army_army_values_plenty_of_action.

[85] Pandy, "History of Gamification," 13.

[86] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 43.

[87] Pandy, "History of Gamification," 13.

[88] Ibid.

[89] Benoit, "Game-Based Learning on Vocabulary," 13.

middle school English Language Learners (ELL) for over a decade between the 2007 and 2017.[90] Since the 1990s and the academic, "Standards Movement," music educators maintained the desire to "cultivate positive attitudes, *engagement*, and joy within the curriculum;" to expand the music curriculum with "multiple sources and approaches;" to "integrate [music] instruction through interdisciplinary connections;" to "emphasize technological literacy;" and to utilize music technology and software as such has proven effective at engaging students.[91] Game-Based Learning maintains great potential to reach all of these goals.

Game Kinds

Gilyazova and Zamoschanskii identify three different kinds of games: "games," "serious games," and "gamification." Many researchers in this field agree that the differences between these kinds of games is found in their purposes.[92] The aim of games is to entertain. The aim of serious games is to develop skills through simulation without a focus on motivation.[93,94] The aim of gamification "is to engage, motivate, teach, and retain students in the learning process by making learning enjoyable."[95] This fundamental difference between the entertaining game and gamification will be bridged in the *Universe of Music Theory* (UoMT) in Chapter Four where performing chord progressions and music theory analyses, amongst other musicianship-related

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[90] Benoit, "Game-Based Learning on Vocabulary," 19.

[91] Dee Hansen, *Handbook for Music Supervision*, Reston, Va: MENC, National Association for Music Education, 2002, 21.

[92] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 45.

[93] Ibid.

[94] Ibid.

[95] Ibid.

skills, will be mixed with fun and engaging music-based game mechanics (combat, challenges, puzzles, etc.).

Principles of Game Design

Mechanics, Dynamics, and Aesthetics

According to Hunicke et al., gamification framework and game design maintain three primary elements: "mechanics, dynamics and aesthetics (MDA)" explained below:[96]

1.) Mechanics includes virtual or real-world gifts or rewards, scores and ranking tables, achievements, avatars, points, badges, levels, quests, team or solo challenges. Mechanics or rules allow students to make a commitment to overcome any obstacles they may encounter.
2.) Dynamics, in its turn, addresses the needs that should be satisfied. It (for example, in the form of storytelling) involves participation, curiosity and immersion in the game reality.
3.) Aesthetics refers to the way game mechanics and dynamics interact with 'art' to produce emotional results. There are other opinions about the gamification framework, but the MDA framework is generally accepted.[97]

Game Thinking

Kapp defines gamification as "using game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems."[98] According to Kapp one of the most important elements of gamification is *game thinking*. Game thinking is the "ability to present a boring duty in the form of an interesting activity, in which people want

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[96] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 43-44.

[97] Ibid.

[98] Ibid., 44.

to invest brain share, time, and energy."[99] The purpose of gamification is to achieve game thinking amongst its participants.

A Definition of a Game

According to scholars, gamification may also include other game mechanics such as "conditionality of events, spatial and temporal boundaries, goals, fixed rules, participant involvement (through the 'reality effect' and fun), freedom, voluntary participation, non-expectation of material utility, abstract challenge, interactivity, feedback and emotional reaction."[100] Based on these mechanics, Gilyazova and Zamoshchanskii suggest the following definition of a game. A game "is a special conditional reality, governed by the rules that are selflessly, voluntarily, unreservedly and cheerfully adopted by the players."[101]

According to Kapp, gamified learning can exist as a "full-fledged educational game," applying "game elements to normal tasks," and as "an engaging classroom experience."[102] The notion that gamification and gamified learning can take the form of a full-fledged educational game is support for the validity of the UoMT in Chapter Four wherein gamification and gamified learning take the form of a full-fledged digital learning game.

Practical Application and Significance

Game-based learning contains intrinsic tenets from the consequential ethics theory, which "focuses on realizing actual—notable and significant—results and, thus, can help promote an applied ethics for school music that is based on concrete criteria of professional

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[99] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 44.

[100] Ibid., 45.

[101] Ibid.

[102] Ibid.

accountability."[103] Guajardo et al. argues that "learning must transform from data (raw and unfiltered) to information (filtered data through some mediating source, e.g., a teacher or the media), then to knowledge (contextualized information), and finally to application (knowledge to action)."[104]

Motivation Within Game Design

According to Schmidt, the way one understands musical information and performance are "manifestations of personality, motivation, cognitive style, and other affective variables."[105] From this understanding, Ward-Steinman proposes that "examinations of these constructs are also critical elements for inclusion in graduate curricula in music education."[106] This evidence supports any medium (game or digital game) or teaching method (gamification, GBL, DGBL, etc.) that focuses on the examination and application of motivation (a critical element in graduate music curricula) as this project does.

Schmidt found that intrinsic motivation (learning/task factor) "was positively related to several music achievement outcomes (practice time, teachers' ratings of performance and effort, and solo/festival and private lesson participation)."[107] Therefore, any method that can increase one's intrinsic motivation for learning and practicing music or music theory ought to be worthy of being pursued. However, Schmidt is not alone in his conclusion of motivation contributing to

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[103] Thomas A. Regelski, "Ethical Dimensions of School-Based Music Education," in *The Oxford Handbook of Philosophy in Music Education*, ed. Wayne D. Bowman and Ana Lucía Frega (Oxford: Oxford University Press, 2012): 293. https://doi.org/10.1093/oxfordhb/9780195394733.013.0016.

[104] Guajardo et al., *Partnerships in Education,* 77.

[105] Patrice Madura Ward-Steinman, *Advances in Social-Psychology and Music Education Research Taylor and Francis,* 2016, 11. doi:10.4324/9781315565743.

[106] Ibid.

[107] Ward-Steinman, *Social-Psychology and Music Education*, 12.

academic musical success. Other scholars such as Marsh, Craven, Hinkley, and Debus all concur that these three motivational factors (intrinsic, extrinsic, and individual autonomy) are the foundation for further motivational constructs (i.e., mastery, cooperation, competition commitment to band, self-concept) and success within music education.[108]

Intrinsic and Extrinsic Motivation

Gilyazova and Zamoshchanskii propose that there are two motivational approaches to gamification. An external motivation approach (by Sebastian Deterding) and an internal motivation approach (by Karl Kapp).[109] Gamification and its factors of intrinsic and extrinsic motivation may be part of a solution to the problem of student engagement.[110] One limitation or critique of both intrinsic and extrinsic motivation is the ability to find the balance between learning and game activities.

Gilyazova and Zamoshchanskii clarify the distinction between these two kinds of motivation is game thinking. Game thinking "contributes to the formation of internal motivation, in contrast to the game mechanics ('points, badges and leaderboards'), which are focused on external motivation."[111] However, Gilyazova and Zamoshchanskii warn that "gamification should never be seen as a universal remedy."[112] They also warn of the negative consequences that result from forgetting that gamification is a method, not a purpose.[113]

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[108] Ward-Steinman, *Social-Psychology and Music Education*, 12.

[109] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 44.

[110] Ibid.

[111] Ibid.

[112] Ibid.

[113] Ibid.

A Motivational Solution

Gilyazova and Zamoshchanskii claim that many "educational theorists and practitioners agree that higher education is facing serious problems involving students' motivation and engagement" and that there is "an increasing number of students [who] see traditional education as inefficient and boring."[114] Their observations conclude that "education needs new approaches."[115] The UoMT offers a practical example of this exciting new motivational approach that could help revitalize music education.

Motivational Factors

Gilyazova and Zamoshchanskii state that the following motivational factors in games "are borrowed by gamification and determine its effectiveness": competition, prizes, strategy and challenges, in-game influence, in-game action, and response.[116] Other motivational variables consist of game mechanics, dynamics, and aesthetics and game thinking as mentioned in the Principles of Game Design subsection.

Schmidt "hypothesized [that] several motivation variables (i.e., group efficacy, self-efficacy, intrinsic/mastery, cooperative orientation, commitment to band, entity vs. incremental orientation) could be incorporated within a single construct."[117] According to Schmidt's findings, "the higher-order, intrinsic/mastery construct was found to be positively correlated with participants' reports of practice time."[118] Therefore demonstrating the connection between

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[114] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 41.

[115] Ibid.

[116] Ibid., 43.

[117] Ward-Steinman, *Social-Psychology and Music Education*, 12-13.

[118] Ibid.

intrinsic motivation and beneficial results. The increase of practice time leads to an increase of performance efficacy.

According to Conway, successful teachers are those who facilitate positive motivators for students and maintain a flexible teaching style that allows for new and multiple methods of re-phrasing and explaining problems and solutions. This flexible teaching style can facilitate improvements in student comprehension of course concepts.[119] However, Conway warns that "no one technique or approach will work for every student."[120] Conway states that it is important to make weekly learning goals for students.[121]

Benefits of Gamification & GBL

The many benefits of gamification and GBL can be categorized into three main concepts: Motivation and Student Engagement, Community, and Critical Thinking.[122, 123, 124]

Motivation and student engagement involve improving students' intrinsic and extrinsic motivation to participate and stay engaged in course material in the classroom and at home. Playing the game will facilitate a need for music competency and a desire to learn (intrinsic motivation). Therefore, classroom participation and engagement will result in in-game competence and vice versa.

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[119] Conway, Music in Education, 197.

[120] Ibid., 199.

[121] Ibid., 200.

[122] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 41; Ibid., 43.

[123] Amy Cox-Petersen, *Educational Partnerships*, SAGE Publications, 2011. Kindle Edition. Kindle Location 14.

[124] Management Association, Information Resources, ed. 2017, *Student Engagement and Participation: Concepts, Methodologies, Tools, and Applications*, Hershey: IGI Global, 1549. Accessed July 25, 2023. ProQuest Ebook Central.

Community involves utilizing aspects of competition and cooperation to develop social skills such as communication and teamwork; promote a safe and friendly learning environment; and facilitate a sense of belonging which can result in better student efficacy. The foreseeable community of the UoMT involves both a community of educators, professionals, students, and players.

Critical thinking involves utilizing logic, reasoning, multi-faceted learning (active, experimental, and problem-based learning) and thinking to facilitate the development of students' digital literacy, cognitive abilities, levels of concentration, attention, and planning skills.

Lifelong Music Involvement

Through intrinsic and extrinsic motivation, engaging and fun gameplay, and real-world application, the UoMT may facilitate a lifelong involvement in music education that "enables, motivates, and inspires students to be more musically active outside of school and throughout life than they would have otherwise without such instruction."[125] This scholarly support and evidence suggests that playing a digital game rooted in music core skills may promote lifelong involvement in music.

World-Wide Communities

Cox-Petersen states that "research studies during the last 25 years all support family and community involvement as a strategy that supports student learning."[126] A sense of community can lead to better student efficacy. Games can provide a sense of community. According to Jean

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[125] Regelski, "Ethical Dimensions," 302.

[126] Cox-Petersen, *Educational Partnerships*, 6.

Lave and Etienne Wenger, situated learning is a view that establishes "learning and community as a social activity that develops from multiple experiences and different types of participation."[127] Cox-Petersen states that not every member of a learning community is actively engaging in these social activities or participates in them. This lack of participation is due to a missing sense of belonging.

Through (digital) games, educators can create a sense of belonging; a safe and welcoming learning environment; and a "different type of participation" that contributes to student learning.[128] Games maintain the potential to be more effective at facilitating "belonging" as opposed to other social activities due to the cultural relevancy of games for the current generation of students (digital natives) and older generations; the multi-subject integration of music-related subjects; and the potential for this multi-subject integration to facilitate a world-wide community of music and non-music students, gamers, performers, scholars, and researchers that would otherwise not be possible.

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[127] Cox-Petersen, *Educational Partnerships*, 14.

[128] Ibid.

Existing, Successful DGBL Apps/Software

Specific digital-game based learning methods include: *Quaver* (a competitive rhythm game; an interactive, adaptive, serious, and impactful scaffolding music education technology and software that is trusted by more than 21,000 schools in all fifty states and in forty-four countries, reaching 10-million students.), *Seasaw* (online multi-modal learning tools that facilitate a student-driven portfolio and communication with teachers, parents, and peers), and *SmartBoard* integrations (interactive whiteboards that help keep online or remote students engaged through active learning).[129, 130, 131, 132, 133]

Popular phone applications such as *MyMusicTheory*, *Perfect Ear: Music & Rhythm*, *Music Theory Helper*, and *Tenuto* facilitate and demonstrate the effectiveness of Digital-Game-

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[129] Jill Moth, "Discussion Thread: Technology," (comment in MUSC 845 at Liberty University, Lynchburg, VA, 2023); QuaverEd, "Quaver Music," (last Accessed on July 3, 2023), https://www.quavered.com/music/; QuaverGame, "Quaver," (Last Accessed on June 7, 2023). https://quavergame.com/.

[130] Seesaw, "Multimodal Learning," (Last Accessed on June 7, 2023). https://web.seesaw.me/multimodal-learning.

[131] Megan Cox, "Seesaw Tutorial for Teachers," Dear DISes, March 13, 2018, YouTube video, 5 min., 13 sec., https://www.youtube.com/watch?v=l231B9sk_nI.

[132] John Meier, "What is a Smart Board and Why do Educators Love Them?" Gordon Flesch Company, (Published on October 11, 2022). https://www.gflesch.com/blog/what-is-a-smart-board.

[133] Ben Rogers, "What Is a SMART Board and What is it Used for?," AdEPT, (Published on August 2, 2021). https://www.adept.co.uk/what-is-a-smart-board-and-what-is-it-used-for/#:~:text=SMART%20Boards%20allow%20teachers%20to,what%20a%20smartboard%20can%20do.

Based Learning.[134, 135, 136, 137] Online Music Theory Programs such as *Smart Music*, *Theta Program*, and *Tone Savy* can facilitate the practice and development of music-core skills outside the classroom.[138]

Virag's Showcase

Virag showcased three music application software and games, available on the iPad, that were effective at engaging students (even those with learning disabilities, autism, ESL) and developing music literacy. Those games were *Piano Dustbuster*, *RecorderMaster*, and *RockMate*.[139] He notes that musical video games, as a popular trend, maintain a history of inspiring players to practice music and real musical instruments. These games (i.e., *Guitar Hero* and *RockBand*) make music and performance (guitar, percussion, and vocal performances)

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[134] "MyMusicTheory – Music Theory Exercises," Android Play Store, 2.3.5, (Published on Jan. 19, 2015, last updated on May 26, 2022), https://play.google.com/store/apps/details?id=com.myrapps.musictheory&hl=en_US&gl=US (Accessed on June 26, 2022).

[135] "Perfect Ear: Music & Rhythm," https://www.perfectear.app/, version 3.9.30, (Published on October 25, 2013, Last Updated on June 26, 2022), https://play.google.com/store/apps/details?id=com.evilduck.musiciankit&utm_source=website&utm_medium=banner (Accessed on June 26, 2022).

[136] "Music Theory Helper," Android Play Store, v2.9.1, (Published on December 21, 2013, Last Updated on June 26, 2022), https://play.google.com/store/apps/details?id=com.okramuf.musikteori&hl=en_US&gl=US (Accessed on June 26, 2022).

[137] "Tenuto," Apple App Store, v.4.2, (Last Updated on August 17, 2021), https://apps.apple.com/us/app/tenuto/id459313476, (Accessed September 14, 2022).

[138] Becky Morrison, "Using Technology in the Collegiate Classroom," (video lecture in MUSC 845 at Liberty University, Lynchburg, VA, 2021).

[139] Virag, "Music Education," 6:01; Ibid., 6:54; Ibid., 8:37.

popular.[140] They "give people of all ages and abilities an experience of what it is like to be playing an instrument, being part of an ensemble, and feel like a rockstar."[141]

Virag states that while the common misconception would be, "if players are having so much fun with a fake guitar, why would they pick up a real one?"[142] He answers this question by pointing to the increase of guitar sales between the years 2003 and 2013 and contributes it to the game *Guitar Hero*.[143] He mentions that because digital music games maintain such an impact on society, culture, and sales, they required entertainment stores to facilitate specific sections just for them.

Virag explains that musical video games lead to student engagement, enthusiasm, and motivation, which results in the physical skills of playing an instrument. He asks, "What can I do to engage my students with [these musical videogames]?"[144] He demonstrated that students are not required to choose between a game and a real instrument. The game develops intrinsic motivation for music performance on real instruments.[145]

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[140] Guitar Hero; RockBand, "RockBand4 Rivals™," (Last Visited on July 9, 2022). https://www.rockband4.com/.

[141] Virag, "Music Education," 2:44.

[142] Ibid., 3:08.

[143] Ibid., 3:28.

[144] Ibid., 4:12

[145] Ibid., 5:38.

Kahoot!

A gamification study done by Campillo-Ferrer et al. investigated the efficiency and efficacy of the popular online gaming platform called *Kahoot!*.[146] The game-based student response system increased students' perception of course concepts and increased their participation and motivation for the course. This study suggests that incorporating gamification via digital participation platforms and the utilization of instructional games in classrooms has the potential to increase students' motivation, improve learning experiences and reinforcement of learning, promote collaboration, foster community, improve quiz scores, increase motivation for professional development, reduce in-class distractions, improve student attention, concentration, engagement, and quality of learning.[147, 148]

Campillo-Ferrar et al. also discussed some disadvantages of game-based teaching. Some teachers found the platform discouraging due to the extra work required to adjust for and incorporate the online course content into their own lesson plans.[149, 150] Further, not all students preferred this digital method of learning. This lack of preference was due to an observed phenomenon of students not preferring to "play an active role in the classroom."[151]

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[146] José-María Campillo-Ferrer, Pedro Miralles-Martínez, and Raquel Sánchez-Ibáñez. "Gamification in Higher Education: Impact on Student Motivation and the Acquisition of Social and Civic Key Competencies." *Sustainability (Basel, Switzerland)* 12, no. 12 (2020): 4822, 2. https://doi.org/10.3390/su12124822.

[147] Campillo-Ferrer et al., "Gamification in Higher Education," 2.

[148] Ibid., 3.

[149] Ibid.

[150] Ibid.

[151] Ibid.

The Psychology Behind Why Games Are Fun

Gibson's study of the popular massively multiplayer open world role playing game (MMORPG), *World of Warcraft*, identifies four concepts (community, interactivity, demassification, and asychroniety) that help to understand gratification.[152] These elements of gratification are believed to be what attracts large followings to participate in playing MMORPGs like *World of Warcraft*.

Community involves any kind of interpersonal interactions and game-based mechanics.[153] Examples include using game-based slang as a way of being part of the community; using forums to discuss and comment on player's actions; "gear as a sign of status;" time spent in-game and rewards acquired; in-game chat, social features, and collaboration.[154]

Interactivity is defined as "the degree into which a player is immersed within the game and how much a player can interact with the environment of the game."[155] Interactive elements include the in-game environment that the player can interact with and the player's character model.[156]

Demassification "refers to the idea that the media being studied offers each player a different experience."[157] Examples of demassification include character customization, character appearance, stat distribution, and skill tree distribution.

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[152] Gibson, "Designed for Play," 15.

[153] Ibid., 14.

[154] Ibid., 62-63.

[155] Ibid., 57-58.

[156] Ibid., 58.

[157] Ibid., 61.

Asycnhroniety can be defined as "the idea that mediated messages can be staggered in time."[158] Asynchroniety involves the player determining how much time they want to allocate playing the game.[159] Examples of asynchroniety include twenty-four-seven access to the game and time commitment to playing the game.

The Cerebral Reward System

In discussing why games are fun, Balkaya and Catak explore the reward system in the human brain.[160] The reward system in the brain is a system related to pleasant or unpleasant sensations.[161] Balkaya and Catak conclude that humans are hardwired to seek and repeat actions that give pleasure and that games are one of these actions. Therefore, the gaming industry capitalizes off of this innate desire to seek pleasure or fun.

The pleasure experienced from playing games also comes from a release of dopamine.[162] Studies show that computer games "engage the dopaminergic brain reward circuit, particularly the striatum and the [ventromedial prefrontal cortex] vmPFC."[163] The vmPFC maintains a "variety of social, cognitive, and affective functions."[164] The vmPFC is an area of the brain that

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[158] Gibson, "Designed for Play," 13.

[159] Ibid., 13-14.

[160] Balkaya, Mustafa, Catak, Guven. (2016). *Why Games Are Fun? The Reward System in the Human Brain*. In: Bostan, B. (eds) Gamer Psychology and Behavior. International Series on Computer Entertainment and Media Technology. Springer, Cham. https://doi.org/10.1007/978-3-319-29904-4_2.

[161] Ibid., 22.

[162] Ibid., 28.

[163] Ibid.

[164] Jaryd Hiser and Michael Koenigs, "The Multifaceted Role of the Ventromedial Prefrontal Cortex in Emotion, Decision Making, Social Cognition, and Psychopathology," *Biology and Psychiatry* 83, 8, (April 15, 2018):638. doi: 10.1016/j.biopsych.2017.10.030.

maintains emotion, fear, and anxiety regulation; value computation; and emotion, memory, and environmental stimuli.[165]

Sixteen Human Motivators

Balkaya and Catak also identify sixteen basic human motivators and their corresponding objects of desire: "power, curiosity, independence, acceptance, order, saving, honor, idealism, social contact, family, status, vengeance, romance, eating, physical activity, and tranquility."[166] The respective objects of desire are: "influence, knowledge, self-reliance, be part of group, organization, collecting things, loyalty to one's parents or community, social justice and equity, companionship, raising your own children, social standing, competition and getting even, sex and beauty, food, exercising the body, and emotional calm."[167] Therefore, incorporating these motivators and their corresponding objects of desire into a game's mechanics and storytelling may lead to an increase in player engagement and desire to play the game.

Why are Games Fun?

In answering the question, "Why games are fun and why we play them," Balkaya and Catak, conclude the psychological reason as: "we play games because games trigger the very same motivations and offer the same 'objects of desire' that we experience and pursue in our 'real' daily life."[168] They also discuss Jon Radoff's list of the five happiness factors in the P.E.R.M.A. model: Positive emotions, Engagement, Relationships (romantic or social bonds),

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[165] Yukihiro Suzuki and Saori C. Tanaka, "Functions of the Ventromedial Prefrontal Cortex in Emotion Regulation Under Stress," *Scientific Reports* 11, (2021): 1. doi: https://doi.org/10.1038/s41598-021-97751-0.

[166] Balkaya and Catak, "Why Games Are Fun?," 29.

[167] Ibid.

[168] Ibid.

Meaning, and Accomplishments.[169] These happiness factors can be found inside of games, where players are free to act upon their motivations "in a medium that is inherently rigged to please [them]," with enough "uncertainty to boost our reward system," and enough "challenge and effort for our motivations to meet their fulfillment, thus giving [them] P.E.R.M.A. experiences."[170] Balkaya and Catak found that playing online games for longer amounts of time "is related to higher scores of depression and social phobia" and that "this relation might be a coping mechanism for people with severe depressive symptoms."[171]

The simplified answer to this question as the following: "Computer games are fun because playing games are fun. Playing games are fun because we are neurally hard wired to derive pleasure from them."[172] People seek, "fun, happiness, meaning, and (for some) refuge in computer games."[173]

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[169] Balkaya and Catak, "Why Games Are Fun?," 30.

[170] Ibid.

[171] Ibid.

[172] Ibid., 35.

[173] Ibid.

Addiction vs Obsession

The presumption of this project's author is that there is such a concept as a "good addiction." This line of thinking is supported by several scholarly sources that identify a distinction between positive or beneficial addictions and negative or harmful addictions.[174, 175, 176, 177, 178] Further, this project holds that there exists a difference between addiction (gaming behavior) and obsession (gaming disorder).

Examples of positive addictions include exercise of the body, mind, and relationship with God (worship, devotion, and prayer), as well as anything else that offers fulfilling enjoyment such as teaching or helping others. Positive addictions can also be identified as actions or activities that generate immediate positive or negative consequences and positive future consequences.

Examples of harmful addictions include drug addictions and obsessions where the activity is prioritized over and to the detriment of one's physical, psychological, social, and

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[174] John Ripley, "Resolving to Enhance Your Life through 'Positive Addiction': [Final Edition]," *The Standard*, (January 2003). https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/newspapers/resolving-enhance-your-life-through-positive/docview/349426635/se-2.

[175] Rafael López, "Beneficial and Harmful Addictions: Two Sides of the Same Coin," Lecturas De Economía 84 (2016): 9, https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/beneficial-harmful-addictions-two-sides-same-coin/docview/1812256287/se-2.

[176] A.V.Y Counseling, "Can I Be Positively Addicted to Something?", (Last Accessed May 21, 2023) (Published on May 22, 2020). https://www.avycs.com/blog/2020/5/21/can-i-be-positively-addicted-to-something#:~:text=Glasser%20claims%20that%20positive%20addictions,their%20negative%20cousins%2C%20enhance%20life.

[177] Emilio Landolfi, "Exercise Addiction," *Sports Medicine* 43, 2 (February, 2013): 111-9, https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/exercise-addiction/docview/1458596424/se-2.

[178] William Glasser, *Positive Addiction*, First edition, New York: Harper & Row, 1976.

spiritual well-being. Negative addictions can also be identified as actions or activities that generate immediate positive (or negative) consequences and negative future consequences.

Warnings of Addiction

Gilyazova and Zamoshchanskii state four warnings to gamification. Warning number one asserts that there is a danger in presenting gamification as a game:

> If gamification was highly involving, [then] the students may experience withdrawal syndrome, which can result in decreased efficiency of education and even in the loss of the effect previously typical of usual (without gamification) classes. It is the main drawback and the main threat specific to gamification, which is based on game thinking and game addiction.[179]

Warning number two reveals that gamification can only function properly if there is a balance between "serious and game activities designed in conformity with psychological and pedagogical principles."[180] A dominance of serious activity may lead to a lack of engagement and a decrease in motivation. A dominance of game activity may lead to a game addiction, "the loss of the socialization value of education as preparation for life."[181] Warning number three argues that when learning is turned into a game, its educational value is squandered.[182] Warning number four discloses the danger that gamification will lead to playing to escape from real-life responsibilities.[183]

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[179] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 48.

[180] Ibid., 49.

[181] Ibid.

[182] Ibid.

[183] Ibid.

Obsession

This sub-section serves to distinguish the differences between gaming behavior, gaming addiction, and gaming disorder. For the purposes of this project, the term "obsession" will be discussed under the context of "gaming disorder" or "gaming-related distress." Gaming disorder is acknowledged by the World Health Organization and psychological studies as an international disease. However, only approximately two to five percent of players experience gaming disorder.[184] Snodgrass et al. defines three main characteristics of gaming disorder.[185] One, the individual losing control over when and for how long they play video games. Two, the individual prioritizing playing games over necessities such as their schoolwork, job, health, or productivity. Three, the individual continues to play and prioritize playing games despite facing negative consequences for doing so.

One distinguishing factor between addiction and obsession can be noted as the following statement from the WHO:

> For gaming disorder to be diagnosed, the behavior pattern must be severe enough that it results in significant impairment to a person's functioning in personal, family, social, educational, occupational or other important areas, and would normally have been evident for at least 12 months.[186]

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[184] Jeffery G. Snodgrass, Wen Zhao, Michael G. Lacy, Shaozeng Zhang, and Rachel Tate, "The Cross-Cultural Expression of Internet Gaming Distress in North America, Europe, and China," *Addictive Behavior Report* (2018): 2. doi: 10.1016/j.abrep.2018.100146.

[185] Ibid., 1.

[186] World Health Organization, "Gaming Disorder," (Accessed on May 3, 2023). https://www.who.int/standards/classifications/frequently-asked-questions/gaming-disorder#:~:text=For%20gaming%20disorder%20to%20be,for%20at%20least%2012%20months.

While Dr. Poznyak distinguishes gaming disorder from gaming behavior he still warns parents to be aware of the amount of time their children are spending playing games.[187] Gaming behavior is associated with low levels of physical activity.

Scholars believe gaming disorder to be related to underlying conditions such as, "loneliness, a sense of personal failure, low-life satisfaction, a need for psychological escape from real life stress and problems, anger and frustration, unhealthy or toxic social interactions, and preexisting mental health problems related to depression and anxiety."[188] Some of these conditions can be mitigated through student or classroom friendships and communities, Christian-based word censorship (curse words, modest speech, and blasphemy), and the connection of using the material players learn in class to do well in the game and vice versa. These connections may help promote a sense of accomplishment and student satisfaction in the classroom, game, and in their own personal life.

Balkaya and Catak, argue that "depressive symptoms and other related problems [of gamers] are the cause of excessive and problematic gaming rather than games being the reason."[189] They support this argument with research that reports "elevations in mood, relaxation, and reduced anxiety with game play" and the social benefits of game play.[190]

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[187] Vladimir Poznyak, "WHO: Gaming disorder: Questions and Answers (Q&A)," *World Health Organization (WHO)*, January 11, 2018, YouTube video, 0:12. https://www.youtube.com/watch?v=lJ71KAO0mtc.

[188] Snodgrass et al., "Internet Gaming Distress," 2.

[189] Balkaya and Catak, "Why Games Are Fun?," 34.

[190] Ibid.

Game World Summary

Part One of Chapter Two has established the historicity, principles, and benefits of gamification and GBL; principles of game design; motivation within game design; existing successful DGBL apps and software; psychology of games, gamification, and GBL; and addressed the issues of addiction and obsession. Gamification, GBL, and DGBL have clear benefits and issues that each music instructor should consider before deciding whether or not utilizing these concepts is right for their classroom or curriculum. Part Two (Educational Theory) will examine the issue of student engagement and explore further how GBL, through current education theories and pedagogies, addresses this issue.

Part Two: Educational Theory

According to gamification expert, Scott Hebert, "the education system is a system in an engagement crisis."[191] Hebert argues that students in the education system are bored and that when one is bored, one will seek entertainment through any means.[192] Students who care in school often care for their grades, not for the sake of learning. Brènè Brown states that "If we want to reignite innovation and passion, we have to humanize work."[193] According to Hebert, this same principle applies to students if one replaces "work" in this quote with "school." Students also desire a choice in what they do—or rather, in how they learn.

According to Daniel H. Pink, "Control leads to compliance: [However], autonomy leads to engagement."[194] Students value creativity and opportunities to be creative. Educators can take the principles of game design and elements (as discussed in Game World) and integrate them into areas where there was no game, such as lesson plans, classrooms, and curriculum design. Not only are games littered with creativity, but Hebert brings to mind that anyone who owns a points credit card is a victim of gamification and a testament to its effectiveness at capturing the attention and participation of others.[195]

Calabrese and Smith discuss the importance of motivation and profitable habits. They quote Jim Ryun, a world-class runner, "Motivation is what gets you started. Habit is what keeps

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[191] Hebert, "The Power of Gamification," 3:26.

[192] Ibid., 3:48.

[193] Ibid., 6:53.

[194] Ibid., 8:02.

[195] Ibid., 10:17.

you going."[196] This dissertation holds the position that any method that inspires a student to review course material throughout the calendar year is a profitable habit. The game concept in Chapter Four aims to accomplish this goal.

Gilyazova and Zamoshchanskii discuss two kinds of motivation: Internal (or intrinsic) motivation, in which one gains inspiration for performing an action from the very action itself, and external (or extrinsic) motivation, in which inspiration is granted to the performer by external factors such as rewards (money, trophies, or fame), pressure (expectations), or punishment (failure or abuse).[197] One example of extrinsic motivation is to practice for and participate in a performance competition where there is a physical reward (i.e., trophy, certificate, or award money). One example of intrinsic motivation is to practice because one genuinely loves to perform (challenging or simple) music on their instrument and the act of performing music (not money, trophies, or physical rewards) is what motivates the individual to continue performing.

The Issue of Student Engagement

In discussing the current Education Engagement Crisis, Gilyazova and Zamoshchanskii state that this issue of student engagement is one of "the most challenging problems inherent in all forms and levels of education, especially in e-learning."[198] Wormeli addresses the student

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[196] Raymond L. Calabrese and Page A. Smith, *The Doctoral Student's Advisor and Mentor Sage Advice from the Experts*, Lanham: Rowman & Littlefield Education, 2010, 7. ProQuest Ebook Central, http://ebookcentral.proquest.com/lib/liberty/detail.action?docID=616364.

[197] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 45.

[198] Ibid., 40.

engagement crisis in describing “students' lack of motivation.”[199] Wormeli states that **“**Instead of whining about students' distractibility in class, we can seek ways to make our lessons developmentally responsive and meaningful so students are engaged.”[200]

According to Ozogul, the high amount of enrollment in online courses in recent years has contributed to the Education Engagement Crisis.[201] Scholars support the need for higher education to innovate utilizing new methods or objects based on previous standards and found gamification to be a successful tool in engaging online students.[202, 203, 204]

Guajardo et al., acknowledge that “play is children’s work and is at the heart of how we engage, activate, and build relationships that then nourish our individual and collective development.”[205] They identify “fun” as being at the core of engagement.[206] They state that

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[199] Rick Wormeli, “The Seven Habits of Highly "Affective" Teachers,” *ASCD* 75, no. 2 (2015). https://www-ascd-org.eu1.proxy.openathens.net/el/articles/the-seven-habits-of-highly-affective-teachers.

[200] Ibid.

[201] Gamze Ozogul, “Best Practices in Engaging Online Learners Through Active and Experiential Learning Strategies,” The interdisciplinary journal of problem-based learning. 12, no. 1 (2018), 2. https://web-p-ebscohost-com.ezproxy.liberty.edu/ehost/pdfviewer/pdfviewer?vid=0&sid=cec5f6c5-3d57-4434-9f38-6ef77185177a%40redis.

[202] Carvalho Andreia, Sergio Jesus Teixeira, Leonilde Olim, Sancha de Campanella, and Teresa Costa. "Pedagogical Innovation in Higher Education and Active Learning Methodologies – a Case Study," *Education & Training (London)* 63, no. 2 (2021;2020;): 199. https://www-emerald-com.ezproxy.liberty.edu/insight/content/doi/10.1108/ET-05-2020-0141/full/html#sec004.

[203] Ibid.

[204] Linda B. Nilson, *Teaching at Its Best: A Research-Based Resource for College Instructors*, New York: John Wiley & Sons, Incorporated, 2016, 225. ProQuest Ebook Central. https://ebookcentral-proquest-com.ezproxy.liberty.edu/lib/liberty/detail.action?pq-origsite=summon&docID=4567495.

[205] Guajardo et al., *Partnerships in Education*, 21.

[206] Ibid.

"learning is a result of teaching that is engaging, empowering, challenging, inspiring, and applicable."[207]

In discussing the ethical dimensions of school-based music education, Regelski states that "Students who fall behind, fail, quit, or lose interest cannot be ignored; ethical responsibility requires special efforts on their behalf."[208] The UoMT may serve as an additional aid or tool to prevent students from falling behind or assist student who are behind by providing motivation and a fun and engaging way to study, review, and learn music theory concepts.

Conway states that music classes should utilize some kind of musical activity (listening, moving singing, or responding to music) that exists even within non-major courses.[209] She also advocates for educators to create assignments that require student interaction and engagement with course content in the same way that music professionals interact with one another and engage with music.[210] Conway facilitates awareness for the necessity to facilitate assignments intended for drilling and building fundamental skills needed for the future. In support of this project, digital games are a great way for students to interact and engage with course content. The UoMT will assist in drilling and building students' fundamental music-core skills (MT, KBS, and SRET).

Conway notes that one solution for dealing with in inattentive students is to ensure that one's teaching methods and activities are "appropriate and engaging."[211] Once again, games are

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[207] Guajardo et al., *Partnerships in Education*, 77.

[208] Regelski, "Ethical Dimensions," 295.

[209] Conway, "Music in Education," 136.

[210] Ibid., 140-141.

[211] Ibid., 147.

one of the most engaging methods of capturing students' attention and even more so for this modern generation of students (as demonstrated more fully in Chapter Two Part Three). If a game is educational and capable of introducing, reinforcing, and reviewing course content, then it is hard to argue that said game would be "inappropriate." Therefore, the UoMT should be considered as it is designed to facilitate student engagement and serves to introduce and reinforce music-core concepts.

Conway also discusses the necessity of varying one's lecture in terms of modality and the utilization of PowerPoints, pictures, movies, and group discussions to do so. The UoMT will add an entirely new mode of learning and discussion for students and educators alike. Both students and educators may draw upon and incorporate the game's imagery, design, and aesthetics into lectures and discussions.

Modal Learning

Research suggests that teaching strategies such as "modal learning" and "active learning" support gamification and GBL. Modal learning is the concept that each individual student has a different preferred method or "mode" of learning. Modal learning suggests that there are four main methods that students learn from: visual, auditory, reading-writing, and kinesthetic (VARK). Further, students may prefer two or three modes of combined learning (VA, AK, VRK, etc.). Gamification, GBL, and DGBL can support the greatest number of combinations of learning methods. Understanding and meeting these preferred methods results in higher levels of student efficacy.[212]

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[212] Tanwinit, and Sittiprapaporn, "Learning Styles of Undergraduate Musical Students," 150-151.

Regelski highlights the necessity of focusing on the needs of the individual student and that not every student has the same needs.[213] The UoMT, a DGBL teaching method, was designed with the individual needs of twenty-first-century students in mind. DGBL, due to its innate nature and combination of visual, aural, reading-writing, and kinesthetic principles and mechanics, maintains the potential to adhere to a very wide variety of preferred learning modes.

Active Learning

Active learning is a method of learning that "engages learners through participation in the cognitive process and certain tasks as well as through collective activities of subjects of the education process."[214] This learning type encompasses a variety of different modal learning methods (visual, auditory, reading/writing, and kinesthetic). Active learning "strategies promote thinking through reasoning and improve problem-solving and decision-making skills."[215] Active learning methods are acknowledged by scholars to facilitate a "great impact on students [even college students], their acquisition of knowledge, and the development of personal qualities."[216, 217]

Games, a form of active learning, maintain the same capabilities to engage students as any other active learning strategy. Gilyazova and Zamoshchanskii state that an "inextricable connection between playing and learning has been recognized and used in education for a long

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[213] Regelski, "Ethical Dimensions," 295.

[214] Gregory Lutsenko, and Olena Lutsenko, *Active Learning: Theory and Practice*, Edited by Gregory Lutsenko and Olena Lutsenko. London: IntechOpen, 2022, BackCover/162?. https://directory.doabooks.org/handle/20.500.12854/90161.

[215] Tanwinit and Sittiprapaporn, "Learning Styles of Undergraduate Musical Students," 156.

[216] Lutsenko and Lutsenko, *Active Learning*, Preface.

[217] Management Association, *Student Engagement and Participation*, 1548.

time."[218] This connection has, in the past, been studied and proven in children but not explored for adult learners.[219] According to Gilyazova and Zamoshchanskii, "game elements in higher education came to attention of scholars in the 20th century during implementation of active learning methods."[220] Benoit's dissertation showed that GBL "combines multiple learning strategies" and enables students to work together, "encourages participation and interaction, and promotes active learning."[221] Aside from intrinsic and extrinsic motivation, Gilyazova and Zamoshchanskii discuss two other motivational theories: Self-Determination Theory (SDT) and Flow Theory.

Self Determination Theory

The self-determination theory (SDT) suggests that to achieve intrinsic motivation games, gamification, or (D)GBL need to provide the player with three psychological needs: autonomy (the freedom to make their own choices), competence (the ability or skill to play the game), and relatedness (social connections with others).[222] The feeling of competence is satisfied by immediate feedback and successful accomplishment of non-trivial tasks that cover a wide range of difficulty levels and that match their level of training.[223] Gilyazova and Zamoshchanskii state that "the need for relatedness is satisfied through constructive competition or cooperation with other students while working on the tasks."[224]

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[218] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 43.

[219] Ibid.

[220] Ibid.

[221] Benoit, "Game-Based Learning on Vocabulary," 38.

[222] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 46.

[223] Ibid.

[224] Ibid.

According to Gilyazova and Zamoshchanskii, SDT is an important source for gamification and its effectiveness is widely recognized by gamification scholars. This recognition of SDT is due to "the fact that this theory fits in the game thinking."[225] Game Thinking is defined as one's ability to experience selflessness, voluntariness, freedom, mystery, markedness, competition, and cooperation. Scholars believe that games are motivating "because of their impact on cognitive, emotional, and social areas of players; therefore, gamification [and (D)GBL] should also focus on these three areas."[226] Further, "the cognitive area is directly related to the need for competence, the emotional area is linked to the need for autonomy, and the social area involves the need for relatedness."[227]

One specific demonstration of the potential social interactions facilitated by games is found in an article entitled, "Online Multiplayer Games for the Social Interactions of Children with Autism Spectrum Disorder: A Resource for Inclusive Education," by Stone et al. This research found that students with autism were able to participate in interrogative, imperative, and declarative speech interactions through social play and interaction of online games.[228] The students with autism also communicated in, initiated, and sustained social interactions through

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[225] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 46.

[226] Ibid.

[227] Ibid.

[228] Bessie G. Stone, Kathy A. Mills, and Beth Saggers, "Online Multiplayer Games for the Social Interactions of Children with Autism Spectrum Disorder: A Resource for Inclusive Education," *International Journal of Inclusive Education* 23, no. 2, (2019): 215. https://www-tandfonline-com.ezproxy.liberty.edu/doi/full/10.1080/13603116.2018.1426051.

written texts, facial gestures (smile, laughing), verbal communication, eye contact, and hand gestures.[229, 230]

Stone et al. found that online multiplayer games maintain the potential to motivate students to communicate more freely and comfortably with one another. The students also displayed more confidence in social interaction than normal.[231] Stone et al. claim that "The pressure to make eye contact was lost in the positivity, 'happiness' and 'excitement' that their students associated with the games."[232] As noted from related sources social interaction and eye contact are challenges for students with autism.[233, 234] This testimony demonstrates how games can help students overcome social, behavioral, and communicative challenges. If a recreational game can help non-neurotypical students with their communication skills, then perhaps an educational game may help students of all kinds with their communication skills as well, or at least serve as a proverbial ice breaker to class introductions and discussions.

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[229] Stone et al., "Online Multiplayer Games," 216.

[230] Ibid.

[231] Ibid., 218.

[232] Ibid.

[233] Sheila J. *Scott, Music Education for Children with Autism Spectrum Disorder a Resource for Teachers*, New York, NY: Oxford University Press, 2017, 5. https://doi-org.ezproxy.liberty.edu/10.1093/acprof:oso/9780190606336.001.0001.

[234] Amanda R. Draper, "Music Education for Students with Autism Spectrum Disorder in a Full-Inclusion Context," *Journal of Research in Music Education* 70, no. 2 (2022): 132-155. https://doi-org.ezproxy.liberty.edu/10.1177/00224294211042833.

Flow Theory

The Flow Theory is another motivation theory utilized to explain the appeal of games in education.[235] According to Csikszentmihalyi, there are six elements of the flow experience: "1) merging action and awareness; 2) centering of attention; 3) loss of ego; 4) control of action and environment; 5) demands for action and clear feedback; 6) autotelic nature of flow."[236] Immediate feedback, commensurate challenges and skills, and clear goals are aspects of gamification and digital game-based learning that make it possible to reach a state of flow. Gilyazova and Zamoshchanskii discuss the need for a balance in the level of challenges. Challenges that are too easy will lead to boredom and challenges that are too difficult may lead to frustration. However, "college students perceived work where skills exceeded challenges to be more enjoyable than flow activities where skills matched challenges."[237]

Gilyazova and Zamoshchanskii highlight an issue with gamification, assessment, and the flow state. They note that commercial games maintain a higher frequency of triggering a flow state in players. However, the educational content and assessments may interrupt the flow state. Scholars recommend adapting and customizing tasks "to maintain flow and ensure prompt feedback" so that "the gamified learning process can run smoothly and imperceptibly, and the flow is not interrupted."[238, 239, 240]

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[235] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 46.

[236] Ibid., 46-47.

[237] Ibid., 47.

[238] Ibid., 29.

[239] Ibid., 47.

[240] Ibid., 32.

Music Pedagogies

There are several different kinds of pedagogies for music education that already incorporate game design elements and principles. The Carabo-Cone pedagogy highlights the necessity of reframing instrumental music practice from "a lifetime of practice slavery" to an engaging learning environment.[241] To achieve this goal, the Carabo-Cone method advocates for the implementation of games, giant images, props, and cut-outs which incorporate musical elements (i.e., staves, fingering charts, rhythmic divisions, and dynamics).[242]

Edward Gordon's music learning theory does not specifically mention the inclusion of games. However, games may facilitate the practice of Gordon's audiational principles (i.e., listening, reading, dictation, memory-based performances and writing, composing, improvising), musical aptitude tests (MAPs), and sequential learning method.[243],[244]

The Orff Approach advocates for involving play in learning and valuing musical imagination and creativity.[245] The Suzuki method demonstrates the need for student engagement ("enjoyable opportunities that require reading and performing music") and focuses on utilizing

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[241] Madeleine Carabo-Cone, "From the Beginning …," *American String Teacher Association* 28, 2, (1978): 24. https://doi.org/10.1177/000313137802800211.

[242] Ibid.

[243] John G. Geake, "An Information Processing Account of Audiational Abilities," *Research Studies in Music Education* 12, 1 (1999): 13. https://doi.org/10.1177/1321103X9901200102.

[244] Edwin E. Gordon, *Learning Sequences in Music: A Contemporary Music Learning Theory* (2012 Edition), GIA Publications, 2018. ProQuest Ebook Central, 27. https://ebookcentral.proquest.com/lib/liberty/detail.action?docID=5306413.

[245] Carlos R. Abril and Brent M. Gault, *Teaching General Music: Approaches, Issues, and Viewpoints* (New York: Oxford University Press, 2016), 25. https://ebookcentral.proquest.com/lib/liberty/detail.action?docID=4310911.

musical recordings.[246] Digital games may facilitate engaging and enjoyable opportunities that require reading and performing music and incorporate musical recordings. Digital games may also facilitate the practice of Kodály's pedagogy and sequential experience (prepare, present, and practice).[247] A microphone may be utilized to facilitate singing, the moveable "*do*" system, and solfège syllables and hand signs.[248]

Educational Theory Summary

Part Two of Chapter Two has identified the issue of student engagement and examined how gamification and GBL already exist and facilitate learning within current educational theories (modal and active learning; SDT; and Flow Theory) and music pedagogies (Carabo-Cone, Gordon's MLT, Orff, Suzuki, and Kodály). Part Three will examine further how the contemporary age group (eighteen to twenty-five) and classroom may benefit from DGBL. Part three will also address the relevance and practicality of DGBL in relation to the contemporary classroom. DGBL relates to the digital age, digital learners, and addresses both the greatest challenge in education (student engagement) and the needs of the twenty-first-century student (community and engagement).

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[246] Abril and Gault, *Teaching General Music*, 25.

[247] Ibid., 76.

[248] Ibid., 73.

Part Three: The 21st-Century Digital Classroom

The Digital Age/Culture Is Now

Current research reveals that the modern world is becoming more and more embedded with the internet, technology, and online learning.[249] This research also suggests that more school-aged children are spending increasing amounts of time utilizing electronic media.[250] According to Young et al., in the year 2009, sixty percent of individuals between ages eight to eighteen were playing video games, and the trend only shows an upward motion.[251] Gilyazova and Zamoshchanskii argue that gamification may be interesting and motivating for "an older generation interested in further or new education."[252] Thiebeault associates educational developments with technological change. The UoMT is a technological change that may lead to further educational developments and motivate younger and older generations to maintain an interest in music.[253]

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[249] Tomáš Kincl, and P. Štrach, "Born Digital: Is there Going to be a New Culture of Digital Natives?," *Journal of Global Scholars of Marketing Science* 31, no. 1 (2021): 30. https://doi.org/10.1080/21639159.2020.1808811.

[250] Michael F. Young, Stephen Slota, Andrew B. Cutter, Gerard Jalette, Greg Mullin, Benedict Lai, Zeus Simeoni, Matthew Tran, and Mariya Yukhymenko, "Our Princess is in another Castle: A Review of Trends in Serious Gaming for Education," *Review of Educational Research* 82, no. 1 (2012): 61.

[251] Ibid.

[252] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 41

[253] Matthew D. Thibeault, "Learning With Sound Recordings: A History of Suzuki's Mediated Pedagogy." *Journal of Research in Music Education* 66, 1 (2018): 23. doi:10.1177/0022429418756879.

Historically, digital technology has facilitated a great impact on society, developments and adaptations in higher education, music education, and the utilization of technological applications in PreK-12 educational settings.[254] Scholars acknowledge the role of digital games as a "driving factor" for integrating game-based learning into the learning environment.[255] Games have been and are still an integral part of the twenty-first-century student's culture. Appealing to this culture of games, technology, and the internet may prove necessary to keep students engaged with course material and increase student efficacy.[256, 257]

Previous attempts at implementing games into education, suggest that games maintain the potential to facilitate educational benefits.[258] Once again, this project points to the words of Deterding, games have already proven their success in enticing hundreds of millions of players all over the world "to spend countless hours and dollars performing menial tasks. Certainly, there must be some way to utilize this power for other [educational] purposes?"[259]

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[254] Kimberly C. Walls, "Music Performance and Learning: The Impact of Digital Technology," *Psychomusicology* 16, no. 1-2 (1997): 68. https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/music-performance-learning-impact-digital/docview/1308658502/se-2.

[255] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 43.

[256] Anna Rosefsky Saavedra and V. Darleen Opfer, "Learning 21st-Century Skills Requires 21st-Century Teaching," *Phi Delta Kappan* 94, 2 (2012), 2. https://go.gale.com/ps/i.do?p=BIC&u=vic_liberty&id=GALE%7CA309459582&v=2.1&it=r&sid=summon.

[257] Steven Boyer, "Constructing and Measuring an 'Audience' for Digital Games," *Journal of Gaming & Virtual Worlds* 5, 2 (2013): 191. doi:10.1386/jgvw.5.2.183_1.

[258] Randel et al. "Games for Educational Purposes" 262.

[259] Deterding, "Gamification: Designing for Motivation," 14.

According to music educator John Kratus, "the nature of music education should reflect the cultural and social milieu in which it exists."[260] Therefore, integrating gamification, game-based learning, or in other words an entire digital game regarding the teaching of music-core skills, into the academia of music education, will allow the disciplines of music to harmonize more fully and relate more closely with students' cultural practices.

Gilyazova and Zamoshchanskii concede that modern education is undergoing a digital transformation, a transformation that has only been accelerated due to the COVID-19 pandemic.[261] The transformation of the digital age in modern education has facilitated an increase in the severity of the Education Engagement Crisis. This increase is due to the plethora of distractions already present on the internet or from distance learning. Gilyazova and Zamoshchanskii state that in both traditional and digital education, "students' engagement is still on the top of the agenda."[262] This Education Engagement Crisis "can be partially solved with the help of digital techniques, which have proved their educational efficiency. One of these technologies is gamification."[263] This dissertation holds the position that a second of these technologies is digital game-based learning. Khalid et al. support the idea that the digitalization of education and e-learning can benefit from gamification as there exists a "digital" generation of students who grew with gadgets, video games, and social media.[264]

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[260] Daniel J. Albert, "Social Media in Music Education: Extending Learning to Where Students 'Live,'" *Music Educators Journal* 102, no. 2 (2015): 32. http://www.jstor.org/stable/24755658.

[261] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 41.

[262] Ibid.

[263] Ibid.

[264] Ibid.

Experts acknowledge the fact that effective teachers need to stay current regarding pedagogy and the need for student engagement. Students today learn differently and may require more relevant ways of learning.[265] Digital Game Based Learning is current in terms of technology, culture, and familiarity. DGBL also facilitates student engagement.[266, 267] DGBL maintains cultural relevancy with the youth, facilitates fun and student engagement and possesses potential to retain the foundations of traditional music education (classical music, rote learning, peer-based discussion, composition, MT, KBS, and SRET).

Gaunt and Westerlund argue that the times in which we live have drastically changed in comparison to those when the traditional curriculum and pedagogical practices were first initiated and devised. A change of times consequently results in a change of student needs. The previous methods of meeting the previous students' needs may no longer be sufficient. Therefore, transformative professionalism must be considered when moving forward in higher music education (HME) in order to address the needs of the next generation of students.[268] This means that it is reasonable and beneficial to consider the changes of the digital age and the

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[265] Guest Expert, "5 Habits of Effective Music Teachers," *Musical U*, (Last visited on November 24, 2022). https://www.musical-u.com/learn/5-habits-of-effective-music-teachers/.

[266] Wilfried Gruhn, "From French Horn to Smartphone: Leveraging Digital Technology and the Digital Turn," *Philosophy of Music Education Review* 30, no. 1 (2022): 45. doi: https://doi.org/10.2979/philmusieducrevi.30.L04.

[267] Jen Jenson, Suzanne De Castell, Rachel Muehrer, and Milena Droumeva. "So You Think You can Play: An Exploratory Study of Music Video Games." *Journal of Music, Technology and Education* 9, no. 3 (2016): 274. https://search-ebscohost-com.eu1.proxy.openathens.net/login.aspx?direct=true&db=a9h&AN=121679330&site=ehost-live&scope=site&custid=liberty&authtype=ip,shib.

[268] Gaunt and Westerlunde, "Higher Music Education: A Changing Game," 42-43.

gaming culture and to find ways of combining these concepts with music education. The UoMT is an attempt at one such combination.

According to Morrison, “Technology can give us necessary tools to deliver content and engage our students.”[269] This notion is also supported by music educator John Kratus in the following quote, "the nature of music education should reflect the cultural and social milieu in which it exist.”[270] Addressing this topic of utilizing technology and engaging students, Taylor asserts that modern music educators “are tasked with building upon past efforts to address new critical issues and anticipate new challenges beyond 2020, to assist with meeting changing musical needs of programs, communities, and the profession at large.”[271] This project is attempting to meet the existing need for student engagement and adapting higher music education (HME) with modern technology and cultural relevancy. In so doing, this project anticipates the future needs of HME by bridging the gap between DGBL, music-core skills (MT, KBS, and SRET), and other fields of music and HME (music academia, natural and scientific sound and music phenomena, and the psychology of music).

The Greatest Challenge in Education

According to Hinckley and the Tanglewood Symposium in 1967, many acknowledged that “the greatest challenge in educational reform is to make schools relevant to our children's future, not to our own past.”[272] According to Choate et al., one of the problems that music

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[269] Becky Morrison, “Using Technology in the Collegiate Classroom,” (video lecture in MUSC 845 at Liberty University, Lynchburg, VA, 2021).

[270] Albert, “Social Media in Music Education,” 32.

[271] Monica Taylor, “Overview of Pivotal Events in Music Education,” (video lecture in MUSC 801 at Liberty University, Lynchburg, VA, 2021).

[272] Hinckley, “Why Vision 2020?,” 21.

educators were having fifty years ago regarding technology was defined as "the staggering difficulty of keeping up with the times. The arts are feeling the impact of the technological revolution and the new ideas that bombard from every side."[273]

Choate et al. highlight the importance of keeping up with technological revolutions, inventions, and ideas and advocate for making music education adequate for the era of technology and games that currently exists. In 1967, they declared that the year 2000 would "bring more rapid technological developments and demands" and that "the artistic professions must not only learn to live in the twentieth century, they are forced to assess and to estimate their bearings for the future."[274] The UoMT aims to assist in keeping up with the technological developments and demands of the twenty-first-century.

Choate et al. state that "Music teachers are finding that to teach as one has been taught is a painfully inadequate and all-too-prevalent means of seeking professional competency."[275] This statement was true for music educators fifty years ago and may still be true for music educators today. Taylor warns that "Without knowledge of our history, future improvements will prove to be impossible. As we rely on the same methods or strategies and never understand that developments can be enhanced with different and more efficient processes and materials."[276] Taylor correlates relying on the same methods and strategies of the past with never being able to

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[273] Robert A. Choate, Charles B. Fowler, Charles E. Brown, and Louis G. Wersen, "The Tanglewood Symposium: Music in American Society," *Music Educators Journal* 54, no. 3 (1967): 68. https://doi.org/10.2307/3391187.

[274] Ibid.

[275] Ibid.

[276] Monica Taylor, "Introduction to the Historical Developments Influencing Music Education," (video lecture in MUSC 801 at Liberty University, Lynchburg, VA, 2021).

understand the developments that can enhance music education. Therefore, this project aims to present a new method and framework for teaching and inspiring students to learn and love music and music theory.

Mary A. Kennedy quotes the MENC's first *Music Education Source Book* in the 1940s which expresses "the need for creative music education."[277] The MENC describes the challenges of creative music education: "One of the greatest difficulties in the creative activity lies in the lack of continuity in this creative phase of music instruction."[278] The MENC states that although elementary teachers maintained success and "considerable growth in stimulating" children's interest in music, "the [creativity or student engagement] gap between these grades and high school or college is too great."[279] The MENC expressed the need for "Teachers of upper elementary and junior high school to carry on with the work of previous teachers."[280] Kennedy notes that "This lack of continuity noted by the profession more than fifty years ago continues to be in evidence today."[281]

Cassidy explores this theme of music-games and confirms in her 2013 case study that music education still faces the challenge of utilizing technology as a tool to facilitate new opportunities for student inspiration, engagement, and participation available in "formal and

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[277] Mary A. Kennedy, "Creative Music Making Since the Time of the Singing Schools: Fringe Benefits," *Journal of Historical Research in Music Education* 21, no.2 (April 1, 2000): 141. https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/creative-music-making-since-time-singing-schools/docview/1297849035/se-2.

[278] Ibid.

[279] Ibid.

[280] Ibid.

[281] Ibid.

informal learning contexts."[282] She demonstrates evidence supporting how music-games promote online community experiences. Cassidy identifies a literature gap, stating that music-games present a unique and untapped "platform to investigate the processes and outcomes of both music and video game participation in a comprehensive context."[283] Walls confirms this literature gap as she advocates for further qualitative studies to be conducted regarding music and instructional technology.[284] Faure-Carvallo et al. also advocate for the need of more research involving the effects of digital games on student learning.[285]

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[282] Gianna G. Cassidy and Anna M. J. M. Paisley, "Music-Games: A Case Study of their Impact," *Research Studies in Music Education* 35, no. 1 (2013): 119. https://doi.org/10.1177/1321103X13488032.

[283] Cassidy, "Music-Games," 119.

[284] Walls " The Impact of Digital Technology,"16

[285] Faure-Carvallo, Adrien, Diego Calderón-Garrido, and Josep Gustems-Carnicer. "Digital Gamification in Secondary Education: A Systematic Review." *Revista Latina De Comunicación Social*, no. 80 (2022): 137. https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/digital-gamification-secondary-education/docview/2711035423/se-2.

The Needs of the 21st-Century Student

The students of the twenty-first-century are experiencing psychological, culturally relevant, and academic engagement needs. The COVID-19 pandemic and the rise of online learning have facilitated psychological problems such as a lack of classroom-engagement, concentration, depression, anxiety, feelings of isolation from teachers and other students.[286, 287, 288] The twenty-first-century student requires psychological supports to meet these needs. These supports may be facilitated through guidance, counselors, exercise, or a game-based community.[289] Games maintain the potential to meet the psychological needs of students by establishing community, collaboration, and trust.[290] The interactive play philosophy found in digital-game-based learning, may assist students in learning and developing a sense of self and belonging.[291]

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[286] Alicia D V Carreon, and Marian M Manansala, "Addressing the Psychosocial Needs of Students Attending Online Classes During This Covid-19 Pandemic," *Journal of Public Health* 43, 2 (2021): 385. doi:10.1093/pubmed/fdab101.

[287] Cathy Stone and Matthew Springer, "Interactivity, Connectedness and 'Teacher-Presence': Engaging and Retaining Students Online," *Australian Journal of Adult Learning* 59, no. 2 (07, 2019): 146-69, https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/interactivity-connectedness-teacher-presence/docview/2342506006/se-2.

[288] Regina Murphy, Francis Ward, Una McCabe, Michael Flannery, Andrea Cleary, Hsiao-Ping Hsu, and Eileen Brennan, "Recasting Embodied and Relational Teaching in the Arts: Teacher Educators Reflect on the Potential of Digital Learning," *Irish Educational Studies* 41, no. 1 (2022): 214. https://doi.org/10.1080/03323315.2021.2022525.

[289] Carreon and Manansala, "The Psychosocial Needs of Students," 385.

[290] David Claxton, Dan Crube, and Jane Young. "Using Initiative Games to Build Community, Cooperation and Trust," *Strategies (Reston, Va.)* 15, no. 1 (2001): 35. https://doi.org/10.1080/08924562.2001.10591521.

[291] Wayne Smith, Alan Oven, and Rod Philpot, "Game-Based Movement Education: Developing A Sense of Self, Belonging, and Community Through Games," *Physical Education and Sport Pedagogy* 26, no. 3 (2021): 242. https://doi.org/10.1080/17408989.2021.1886267.

The need for cultural relevance can be understood as the need for digital and gaming literacy. Scholars acknowledge that playing games from a young age may increase digital literacy.[292] The internet is hosts a variety of distractions (i.e., games, videos, and entertainment).[293] The gaming industry exhibits a correlation between player engagement and financial success.[294] Therefore, applying a correlation between player engagement and the educational world may result in improved student efficacy and engagement of course material. Some scholars believe that digital games are more interactive and engaging than traditional methods of teaching.[295] The theory of communities of practice emphasizes learning and understanding through the participation of various social practices.[296] A game-based classroom community maintains the potential to engage students with course material and facilitate social practices interactions that may not otherwise be available for students.

Both digital and non-digital games and game-based learning methods have already been utilized and seen as successful in music and other academic subjects such as social sciences,

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[292] Helen Melander Bowden and Pål Aarsand, "Designing and Assessing Digital Games in a Classroom: An Emerging Culture of Critique," *Learning, Media and Technology* 45, no. 4 (2020). https://doi.org/10.1080/17439884.2020.1727500.

[293] Marina Wernholm, “Children’s Out-of-School Learning in Digital Gaming Communities,” *Designs for Learning* 13, 1 (2021): 8. doi:10.16993/dfl.164.

[294] Yan Huang, Stefanus Jasin, and Puneet Manchanda, "“Level Up”: Leveraging Skill and Engagement to Maximize Player Game-Play in Online Video Games," *Information Systems Research* 30, no. 3 (2019): 928. https://doi.org/10.1287/isre.2019.0839.

[295] Ivan Kaltman, "Digital Game-Based Learning Enhances Literacy," *The Education Digest*, 04, (2019): 44, https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/mag azines/digital-game-based-learning-enhances-literacy/docview/2189564507/se-2.

[296] Valerie Farnsworth, Irene Kleanthous, and Etienne Wenger-Trayner, "Communities of Practice as a Social Theory of Learning: A Conversation with Etienne Wenger," *British Journal of Educational Studies* 64, no. 2 (2016): 139. https://doi.org/10.1080/00071005.2015.1133799.

math, language arts, physics, biology, and logic.[297, 298] Historical data points to the effectiveness of "gamified education in overcoming engagement detractors such as long-distance learning settings and lack of practice discipline in new music settings."[299] Digital games maintain the potential to keep students engaged through: intrinsic motivation to play the game that comes from experiencing a factor of fun while maintaining a learning-based challenge;[300, 301, 302] active learning; and Wenger's Social Theory of Learning (learning through experience, sense of belonging, performance, struggling, and participation).[303]

What Digital Creativity Can Do

Computers may be the key to accessing digital technology and unlocking the digital creativity needed to meet the educational, pedagogical, and technological challenges of the twenty-first-century. Many scholars acknowledge the benefits of computers in education and opportunities. Kesler states, "Computer programs are rapidly opening the doors of creativity."[304] Even Choate et al., from the Tanglewood Symposium (in 1967) acknowledged the importance and usefulness of computers and technology in music education.[305] Since 1967, computers and

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[297] Erin Hillier, "Demystifying Differentiation for the Elementary Music Classroom," *Music Educators Journal* 97, no. 4 (2011): 51. http://www.jstor.org/stable/23012616.

[298] Randel et al., "Games for Educational Purposes," 265.

[299] Espinosa, "Gamification Strategies for Music Educators," 34.

[300] Huang et al., "A Measure of Social Behavior," 386.

[301] Benoit, "Game-Based Learning on Vocabulary," 40.

[302] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 45.

[303] Wernholm, "Learning in Digital Gaming Communities," 1.

[304] Marilyn Kesler, interviewed by author, "Today's Suzuki Method," *School Band & Orchestra* 16, 11 (2013): 20. https://search.ebscohost.com/login.aspx?direct=true&db=ehh&AN=102587931&site=ehost-live&scope=site.

[305] Choate et al., "The Tanglewood Symposium," 65.

technology have only become more significant and advantageous in all of education (preK-College). Taylor advocates for incorporating more technology into music education: "Our fast-paced society increasingly calls for including software and other technologies that will aid in deepening the quality of instruction over time. There should be a conscious and extensive reflection of when it is appropriate to incorporate relevant technologies to add another dimension to educators' understanding of how to best address varied instructional needs."[306]

Minors et al., advocates and discusses the importance of digital creativity-inspiring strategies and technologies in the "[engagement, facilitation,] production, dissemination, and consumption, of [cross-discipline collaboration, digital literacy,] music, and music education." [307] According to Minors et al., there is a need to expand creativity and "embrace the world of the internet."[308] Their rationale is derived from the rapid change in higher education and the music industry. There exists an "imperative for networking and innovation, and the necessity of being able to negotiate cultural differences."[309] They argue that the music industry, higher education (HE), and higher music education (HME) are changing fast and to adapt to these technological changes and "provide a relevant and valuable educational experience," educators must maintain current in information and pedagogies regarding these new technological developments (games, technology, the internet, and digital literacy).[310]

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[306] Monica Taylor, "Integrating Multicultural Content and Technology in the Music Classroom," (video lecture in MUSC 801 at Liberty University, Lynchburg, VA, 2021).

[307] Helen Julia Minors, Pamela Burnard, Charles Wiffen, Zaina Shihabi, and J Simon van der Walt, "Mapping Trends and Framing Issues in Higher Music Education: Changing Minds/Changing Practices," *London Review of Education*. 15, no. 3 (2017), 463. doi:10.18546/LRE.15.3.09.

[308] Minors et. al., "Trends and Issues in Higher Music Education," 458.

[309] Ibid.

[310] Ibid., 457.

Digital Game-Based Learning may facilitate educational relevancy for students and contribute to a valuable educational experience. DGBL maintains this potential with the ability to combine the educational experience with elements of fun, memorable, and engaging activities, which in turn may facilitate higher levels of student efficacy and retention.[311] Digital technologies maintain great potential to enhance and extend learning. However, these technologies may also disrupt learning.[312] This project aims to focus on how DGBL can enhance and extend learning while mitigating, and circumventing where possible, any disruptive aspects involved in a digital learning game rooted in music-core concepts.

21st-Century Classroom Summary

Part Three of Chapter Two has reviewed and established support for the relevance and practicality of DGBL within the sphere (cultural context) of modern education; analyzed and identified several key factors of the current context and culture of the twenty-first-century (need for engagement, community, and technological adaptations in HME) that support DGBL as an effective and engaging teaching method; and highlighted the significance and potential of including digital creativity in education. Chapter three will showcase the methods for a proposed future case study utilizing the UoMT.

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[311] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 46.

[312] Minors et. al., "Trends and Issues in Higher Music Education," 462.

CHAPTER THREE: DESIGN METHODOLOGY

Introduction

Chapter Three will accomplish five goals of explaining the design methodology utilized in this project's research and design. These five goals are to identify the research methods utilized in the design and structure of the *Universe of Music Theory: Music Masters* (UoMT); to examine design procedures and elements utilized to form the UoMT; to address the questions and hypotheses from Chapter One; to identify the methods utilized in identifying the primary target population of the UoMT; and to examine the recommended setting for playing the UoMT.

Research Methods

This project was facilitated under the framework of a pragmatic worldview. The following research methods were involved in its approach: historic, qualitative, descriptive, correlational, quasi-quantitative, and applied research. The historical research for this project provided legitimacy to the proposal of a new learning tool (the UoMT). The qualitative research provided scholarly support for the UoMT by examining the unquantifiable thoughts, opinions, and case studies done by other researchers in the fields of gamification, GBL, DGBL, and the psychology of playing games. The descriptive research aided in identifying the issue of student engagement, the primary target audience for the UoMT, and the implementation of the features, mechanics, dynamics, and aesthetics, as well as music core and related concepts, into a digital game-based form of learning. Correlational research in the project facilitated scholarly and historical support and evidence for the potential that the UoMT maintains to positively impact music education at all levels and across a wide variety of music-related fields and countries. The quasi-quantitative research manifested the potential for future quantitative case studies to impact

and measure test scores and growth of music programs. Finally, applied research showcased the practicality of the project.

Historical Research

The research for the Universe of Music Theory maintained a historical research methodology because the very identity of the project itself (being a digital game) is founded on the academic standing of past research articles, case studies, and historical documentation. This project is based on the historic account of past events (the results and implications of research and studies based on gamification, GBL, DGBL, and the psychology of playing games) and includes practical implications (see Benefits of Gamification and GBL from Chapter Two, Part One). This research design focuses on interpreting historical events (the historical and current need for student engagement and for the adaptation and implementation of music technology in the music curricula) to predict successful future events utilizing the UoMT as a supplemental and combinational (in class and outside of class) learning tool for music core courses that may circumvent many of the hardships experienced by the historical use of gamification, GBL, DGBL in the classroom and the negative effects of gaming obsessions.

Qualitative Research

The research for the UoMT utilized qualitative research by identifying and incorporating subjective information (opinions, beliefs, meanings, attributes) that is difficult to quantify mathematically. The qualitative information studied in this research mainly stems from the review of literature in Chapter Two where opinions, beliefs, and meanings regarding gamification, GBL, DGBL, and the psychology of playing games are discussed. This qualitative research is significant because it addresses many of the conceived issues with gamification, GBL, DGBL, and gaming in general. These issues are addressed (see Appendix B and C) in the

design of the UoMT's desire to maintain consistency of DGBL throughout the two-year music core program and cross the interdisciplinary boundaries of music academia, scientific and natural sound phenomena, and the psychology of music and games.

Descriptive Research

The research for the UoMT facilitated reviewing descriptive research due to its primary target audience being twenty-first-century college music theory students (digital natives and adults). The notion that DGBL maintains great potential to engage digital natives is derived from characteristics of the population and observed and recorded phenomena (the gaming culture). Descriptive research was collected through observation- and review-based methods of historic and current case studies, surveys, and other research materials (published articles, journals, etc.) concerning the impact of game thinking, student engagement and motivation, the correlational benefits of gamification, GBL, DGBL, the psychology behind playing games on the brain, and desired learning outcomes.

Correlational Research

The research for the UoMT was correlational because it identified a relationship between gamification, game-based learning, and digital game-based learning. This relationship includes game thinking, game design, intrinsic and extrinsic motivation, and shared benefits (student engagement and motivation, community, and critical thinking). Furthermore, this research identified a correlation between these learning methods with the historic and twenty-first century needs for student engagement and technological adaptability. These correlations are significant because they maintain great potential to positively impact the future of music education and have heavily influenced the design of the Universe of Music Theory by leading to research-supported

implementation of music academia, scientific and natural sound phenomena, and the psychology of music into game design elements and mechanics.

Quasi-Quantitative Research

While the UoMT is not quantitative in design or nature, it maintains the potential for future quasi-quantitative research that can facilitate efforts for the measurement of summative and formative assessments and student growth concerning their current and future levels of understanding. The UoMT maintains features that track student growth and development, specifically when considering such actions as: performing chord progressions, note identification, chord spelling and identification, and other MT-, KBS-, and SRET-related exercises. However, this potential for future quantitative research cannot be achieved unless the UoMT is first developed.

Applied Research

The applied research done for the design of the UoMT focuses on combining game design elements, principles, and psychology; music-core skills, academia, phenomena, psychology, and the research from Chapter Two into one practical digital game concept. The applied research is significant because it meets and predicts the needs of current and future students and educational games by proposing the UoMT and providing an Educational Game Design summary (see Chapter Five). Regardless of whether or not the UoMT is developed, the Educational Game Design summary provides highlights of design elements utilized in the UoMT that maintain potential to be utilized for other academic subjects.

Design Procedures

The procedures taken to design the Universe of Music Theory involved five main steps.

1.) Step one, identify one or more needs. The needs identified were the historic and current needs for student engagement and technological adaptability within the music curricula, specifically higher music education curricula.
2.) Step two, identify previous literature related to student engagement and technological adaptations in music education. Among other discoveries, this literature review process revealed gamification, GBL, DGBL, and the wide appeal and efficacy of multimodal learning (VARK).
3.) Step three, identify opportunities to utilize music core and other music-related concepts into already existing game-based systems. In this case utilizing music core concepts in praxial combat, puzzles, and exploration and utilizing other music-related concepts in the form of skill trees.
4.) Step four, optimize the opportunities and methods of in-game skill acquisition. Prepare every standard RPG element for the utilization of music core and music-related concepts.
5.) Step five, draw out these ideas and concepts on paper or Microsoft paint.

Design Elements

The design elements of the UoMT are set in a role-playing game (RPG) aesthetic. RPGs are a common game genre commonly containing the following features and elements:

- Storyline (a narrative-driven reason to continue playing the game and explanation for events in the game.
- Leveling-up (getting "stronger" in-game).
- Skill points (fictional points earned when leveling up that can be spent on in-game aesthetically pleasing in-game abilities).
- Skill trees (a system and window that displays a number of tiered abilities that can be purchased utilizing skill points).
- Turn-based combat (a combat design where actions are taken in sequence of Player then Enemy or vice versa).
- Free-form combat (a combat design where actions happen in real-time).
- Loot (armor, weapons, accessories, and items that are earned after defeating enemies in combat).
- Boss battles (a significant change in difficulty from normal battles which are accompanied by more dramatic music and higher quality of loot).
- Quests (missions or objectives given to players to complete, often menial tasks but may vary in difficulty and importance).
- Player-versus-player combat (PvP is a combat design where players fight against one another rather than normal enemies in real-time or turn based combat).
- Large open-world maps ("open-world" means there are no limits to how far one may travel in the game).

Special care was taken to utilize music core skills and scientific and natural sound and music phenomena in the place of might and magic. This opportunity to teach students about further fields of interconnected music subjects should not be ignored. While learning about these topics, aesthetically pleasing and exaggerated digital effects will accompany the player. This is to engage the player with the course content in a way that they are familiar with and that is exciting. The enemy design was based on attempting to incorporate real music-theory-based notation and promote chord identification skills. Further details on the design of the UoMT are showcased specifically in Chapter Four.

Teaching Evaluation

Maintaining assessments and evaluations of teachers and curricula is a vital element of successful academic programs. Wheeler examines the necessary aspects of how to maintain a successful teaching-evaluation system. Wheeler's examination is important to consider concerning this project, because the UoMT aims to be a successful academic evaluation system. Wheeler poses the following questions:

> (1) What is the purpose?
>
> (2) How will it be used?
>
> (3) Why is this the best system?
>
> (4) What are the implications for our faculty evaluation system? And
>
> (5) Is it a valid and reliable system?

> [This process gives us a] good idea of what the system is about, how it will be helpful, and how it fits with our goals. Having a sound operating process requires that we move to the details of implementing the system to ensure that people can utilize it effectively and efficiently. In that case, here are some questions that would have to be answered:
>
> (1) Who will administer it?
>
> (2) How will the data be handled? With whom will data be shared? How will confidentiality be ensured?
>
> (3) What's the timeline?
>
> (4) How does it fit with the total evaluation system? and
>
> (5) How will the data be processed?[313]

[313] Wheeler, *Servant Leadership for Higher Education*, 104.

This dissertation will now answer the above questions as if they were directed at the UoMT.

1. The purpose of this project is to create a fun and engaging learning environment for music-core students accessible to both in-person and online students that will instill within students the desire to review, practice, and learn music theory concepts all year round.
2. The game concept will be primarily utilized at the collegiate level. However, future studies may be conducted to test its efficacy at lower levels of education (K-12).
3. Digital game-based learning is one of the best systems of facilitating student engagement and motivation for learning and reviewing music-core concepts. This is due to a variety of factors regarding intrinsic and extrinsic motivation; the psychology and elements of game design; how music and games relate to the way the human brain learns; and the appeal to the modern technological and game-based student culture as highlighted in Chapter Two.
4. The implications for faculty are that faculty would gain a greater understanding of students' strengths and weaknesses through optimized displays and analyzations of student comprehension in-game.

This dissertation will now answer the second set of questions posed by Wheeler:

1. The game will be administered by purchase and contain a game ID that is compatible to register with a student's course. In this way, any teacher will be able to track their student's progress and statistical information (speed, accuracy, and level of comprehension).

2. The data may be handled by the educators and utilized to facilitate a more effective learning experience and higher quality feedback for the student. The data will only be shared with the professor while the course registration is active. Course registration synced to the player's ID only lasts for the duration of the course. In all other instances, this statistical information is public and displayed on the player's in-game profile page where they can choose to keep their statistical information public or restrict access to "friends only," "classmates only," or private. The platform and the information is not so sensitive as to require any form of permanent confidentiality.
3. The timeline aligns with that of the institution's academic scheduling. This means that information between the student's statistics and the teacher is shared only for as long as the course lasts. However, should a student be enrolled in the next course series, all the prior information and vacation statistics will be available to the new professor.
4. This game may facilitate more effective evaluations, assessments, and personalized feedback for students as the game prioritizes reinforcing music-core concepts through fun and engaging methods.
5. The data will be processed by keeping track and accumulating the player's data while they play and configured and displayed into charts or graphs at the professor's leisure. This will allow the professor to see more clearly which areas of MT, KBS, and SRET the student is excelling in or lacking in and therefore the professor can provide more precise assistance in those areas. The student would also maintain access to their own data and be able to review the concepts most difficult for them.

Questions and Hypotheses

Online and in-person college students need a way to practice, review, and learn music theory concepts over the summer and year-round; otherwise, students risk decreased retention of learned material. Providing and developing a concept for college students to facilitate fun while learning and reviewing music theory concepts may become an excellent example for creating learning games for other academic disciplines. Therefore, if the study produces one example model of game and course implementation and application, then it is possible to apply this same model to other fields of study, such as language, math, and science classes.[314]

Ultimately, the rationale for choosing this project revolves around nurturing a desire for students to want to learn and review music-core concepts (MT, KBS, and SRET) in their spare time. By making learning fun, the entire world of education can benefit. Gamification, game-based learning (GBL), and digital game-based learning (DGBL) have been rising in popularity in education over the last decade.[315] The Education Engagement Crisis and current research studies conducted on these concepts, regarding their abilities to engage and intrinsically motivate students' education, nurture their popularity.[316]

Despite this rise in popularity and influx of research studies, many school administrations and educators are still hesitant about incorporating gamification and game-based learning into the classroom. As Benoit describes this phenomenon in her dissertation, "the majority [of

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[314] Piñero Charlo et. al., "Educational Gamification," 1; Benoit, "Game-Based Learning on Vocabulary," 40.

[315] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 43.

[316] Hebert, "Gamification in Education," 9:46. Piñero Charlo et. al., "Educational Gamification," 4-5; Sterling, "Growth in Game-Based Learning," 50.

stakeholders in education] support game-based learning yet found that less than 10% of teachers implemented game-based learning into their instruction."[317] Researchers found that due to intrinsic motivation to play and the "fun factor," these teaching strategies can be just as effective as traditional learning methods, if not more.[318] Regardless of the scholarly literature promoting gamification and game-based learning, some researchers still admit that the overall research regarding these topics is still in its infancy and that there is much more to learn. As an exploration of these ideas (gamification, GBL, and DGBL), this study will seek to answer the following questions:

> **Research Question One:** How can gamification, GBL, DGBL and the secrets of the gaming industry (i.e., what makes games so addicting and fun to play?) be applied to the online or in-person classroom and yield academic results?
>
> **Hypothesis One:** The utilization of gamification, GBL, DGBL, and the techniques of the gaming industry (i.e., what makes games so addicting and fun to play?) can be applied to the online or in-person classroom and yield positive academic results by serving as a supplementary learning tool which facilitates cultural relevance, course retention, student efficacy, growth as musicians, engagement and motivation for learning and reviewing course material.

The goals of education have been affected in the past by the success of gamification, game-based learning and digital game-based learning. When applied as a teaching strategy, incorporating the concepts of gamification, GBL, and DGBL may aid in students' personal and musical growth and inspire them to keep learning even after the school year ends. As Molina-Carmona and Fara Llorens-Largo explain, gamification has recently been set forth as a "successful strategy to

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[317] Benoit, "Game-Based Learning on Vocabulary," 39.

[318] Ibid; Young et al., "Serious Gaming for Education," 78.

engage users, with potential for online education."[319] Gilyazova and Zamoshchanskii also express the need for a balance between intrinsic and extrinsic motivation as a central facet of gamification and human learning that should allow for its incorporation into the educational setting.[320] Music classrooms may implement gamification, GBL, and DGBL by applying previously studied and suggested frameworks for what works; what does not work; and what may be improved in gamification GBL, and DGBL.

> **Research Question Two:** What are some examples of music-theory-based games that can help or maintain the potential to help students of all ages and levels of education, or specifically online college students, achieve self-growth in their musicianship, application, and retention of music theory?
>
> **Hypothesis Two:** Digital music-theory-based games (i.e., *Quaver*, *Seesaw*, *Kahoot!*, and the UoMT,) maintain great potential to facilitate growth in musicianship, application, and retention of music-core concepts for students of all ages and levels of education.

Proposed music theory-based learning games exist for college-level education. Such games include *Musical Detective*, *Musical Crime Scene*, *Musical Impostors*, *Musical Marbles*, *Sightreading Bridge*, *Music Theory Chess*, *The Wheel of 5ths*, *Lord of the Chords*, *Concerto!*, and the UoMT.[321] While these games may be untested for their efficacy, research supports that they may achieve the desired results of making music theory fun and engaging for college students and promote lifelong music involvement.[322] According to the first International

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[319] Molina-Carmona and Fara Llorens-Largo, "Gamification and Advanced Technology," 85.

[320] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 44.

[321] Richards, "Making Music Theory Fun," 24-30; Ibid., 90-93.

[322] Piñero Charlo et al., "Trends on Educational Gamification," 1-2; Ibid., 4-5.

Workshop on Social, Semantic, Adaptive, and Gamification Techniques and Technologies for Distance Learning,

> The motivation behind introducing games, beside the fun aspect, is the hope that, at some point in the future, our e-learning systems will be working in a similar way to computer games, in the sense that learners will be "hooked" to them without any external pressure and will want to explore and learn more of their own accord, thus being immersed completely in the experience.[323]

Furthermore, the aforementioned game concepts pave the way for future studies regarding the effectiveness of gamification and game-based learning in the music theory classroom. Regarding online learning, this dissertation aims to produce the framework for a music theory-based learning game that is appealing to college students and that promotes self-growth, music theory retention, and summer break retention.

> **Research Question Three:** Do "good addictions" exist? If "good addictions" do exist, can they be used to positively affect student learning outcomes despite students maintaining a "good addiction" to a digital game-based form of learning?
>
> **Hypothesis Three:** Good addictions do exist (i.e., learning, exercise, reading, and Bible study). The pedagogical implications from good addictions to a digital game-based form of learning maintain the potential to positively affect student learning outcomes through fun, engaging, and intrinsically motivating learning methods and environments that assist in facilitating growth in musicianship, course retention, and combatting summer learning loss.

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[323] International Workshop on Social, Semantic. *Higher Education for All from Challenges to Novel Technology-Enhanced Solutions: First International Workshop on Social, Semantic, Adaptive and Gamification Techniques and Technologies for Distance Learning*, HEFA 2017, Maceió, Brazil, March 20-24, 2017, Revised Selected Papers. Cham, Switzerland: Springer, 2018, Preface VI. https://doi.org/10.1007/978-3-319-97934-2.

The digital natives of today have grown up with a culture of games, technology, and the internet. Research, as shown in Chapter Two Part One, presents understandings of both beneficial and harmful addictions. Due to the innate priority of games being "to facilitate fun," it is only indicative that games maintain the potential and capabilities to engage their players' attention in ways that traditional learning cannot. Therefore, many scholars maintain inquiries and research regarding the utilization of GBL and DGBL.

However, medical research has also diagnosed a small percentage of digital natives with gaming disorder: a harmful addiction where one prioritizes the digital life in the game over their real-world health and obligations. Current research maintains a correlation between gaming disorders and underlying conditions such as depression, loneliness, and low self-esteem. Games are already addictive enough to cause large audiences of players to spend countless hours performing menial tasks. For that reason, games maintain an untapped and special capacity to serve as a learning medium in the field of higher music education. Many higher education students are digital natives, and many digital natives will become college students. Discovering how to combine the elements of games with the teachings of the music-core curriculum may facilitate astronomical benefits for the field of music education.

Participants

The age group of the primary target audience of the UoMT are digital natives between the ages of eighteen and twenty-four years old. This age range was decided on due to the common collegiate enrollment of digital natives within that age range and the high likelihood of them being familiar with technology, games, and the internet. Digital natives have also been identified in Chapter Two as a population who have grown up with technology, games, and the internet making this multi-modal digital form of learning contain a high perceived success rate of

student engagement and student efficacy. It should be noted that secondary populations of students who may benefit from playing the UoMT may include younger middle school or high school students as well as older adult learners beyond the age range of the primary target audience.

Setting

The UoMT may find its most effective setting in a MIDI lab where students maintain the opportunity to learn music theory while having fun and interacting with one another within the structured confines of an academic institution. The UoMT was also designed to be played from home to promote the learning and reinforcement of music-core skills and content even after classes end. Playing the game will result in reinforcing learned concepts taught in class. Learned concepts taught in class will result in maintaining an edge in the game and furthering in-game progress. The goal in designing an online digital game rooted in music-core concepts along with this cycle of intrinsic and extrinsic motivation to learn music is intended to facilitate a lifelong involvement in music.

Summary

This project was facilitated under a pragmatic worldview. A historic, descriptive, correlational, qualitative, quasi-quantitative, and applied research approach was taken in the design of the Universe of Music Theory. This was viewed as the best approach to this project because of its vast potential to establish legitimacy, identify issues, patterns, and populations, and facilitate a holistic digital game rooted in music core concepts that explores music-related academia, phenomena, and psychology in an engaging, fun, motivating, and music-involved way. The design elements utilized historic and modern research and needs while implementing game-based principles, mechanics, dynamics, aesthetics, and psychology to offer a proposed

method aimed at meeting the identified gaps and needs of modern students in modern higher music education.

CHAPTER FOUR: THE GAME CONCEPT

This chapter begins by defining and identifying what copyright is and why it is important. After establishing the importance of copyright notice, a statement of copyright regarding the proposed game concept will be provided. Finally, the findings of this study will be addressed. The proposed game, the *Universe of Music Theory: Music Masters* (UoMT), its features, concepts, diagrams, learning focused framework and the ways in which the UoMT compensates for all the negative factors found in traditional games will be explored (see also Appendices B and C).

Reviewing Copyright

According to the United States Copyright Office, copyright is defined as, "a type of intellectual property that protects original works of authorship as soon as an author fixes the work in a tangible form of expression."[324] Different types copyrightable works include "paintings, photographs, illustrations, musical compositions, sound recordings, computer programs, books, poems, blog posts, movies, architectural works, plays, and so much more!"[325]

For a work to be eligible for copyright protection, it must have independent creation (created by the author without copying another work) and it must be creative. A copyright work must also be fixed, "captured by the authority of an author in a sufficiently permanent medium such that the work can be perceived, reproduced, or communicated."[326] Recordings and writings are examples of fixed works. The Copyright Office finds it important to note that "copyright

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[324] U.S. Copyright Office, "What Is Copyright?," (Accessed May 4, 2023), https://www.copyright.gov/what-is-copyright/.

[325] Ibid.

[326] Ibid.

protects expression, and never ideas, procedures, methods, systems, processes, concepts, principles, or discoveries."[327]

Copyright law provides copyright owners with exclusive rights to reproduce, derive works based on the original, distribute, perform, and display the original work as well as to allow others to do the same. For works created after January 1, 1978, copyright protection lasts for the "term of life of the author plus seventy years after the author's death."[328] A work is automatically protected by copyright. However, registering one's copyright has legal benefits. In the United States, a copyright claim can only be registered at the Copyright Office. The other kinds of intellectual property rights include patents and trademarks. Patents protect "inventions or discoveries, designs for articles of manufacture, and plant varietals."[329] Trademarks protect "words, names, symbols, or devices used in trade with goods or services to indicate the source of the goods and to distinguish them from the goods or services of others."[330]

To specifically register a copyright for a computer program, it is advised to submit source code as identifying material.[331] The Office of Copyright advises that one's application is submitted before their work is published.[332] The U.S. Office of Copyright acknowledges videogames as containing "two major components: audiovisual material that appears on screen

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[327] U.S. Copyright Office, "What Is Copyright?."

[328] Ibid.

[329] Ibid.

[330] Ibid.

[331] U.S. Copyright Office, "Circular 2 Copyright Registration," (Last Revised in May, 2022) (Accessed on May 4, 2023), 4. https://www.copyright.gov/circs/circ02.pdf

[332] U.S. Copyright Office, "Circular 61 Copyright Registration of Computer Programs," Last Revised in March, 2021. (Accessed on May 4, 2023), 1. https://www.copyright.gov/circs/circ61.pdf.

and the computer program that runs the game."[333] Both components can be registered in the same application. The following may also be submitted as identifying material in the copyright registration application of a videogame: "a photograph, that contains representative portions of the audiovisual elements of the videogame and a brief written description of the game."[334]

Fair Use Condition

While the following content is the original work of the author, the author concedes that he does not and may never have the means to finance and produce the game concept. Considering this, if any persons, businesses, or institutions, with the means (time, funding, and manpower) would like to pursue the development of the Universe of Music Theory, may do so on the condition that the author is hired for the production of the game as a game design consultant on retainer and maintains a percentage of ownership of the game's future revenue, equity, and influence on the design and direction of future game development. Further and final details and propositions may be discussed at the proper time and place.

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[333] U.S. Copyright Office, "Circular 61 Copyright Registration of Computer Programs," 1.

[334] Ibid., 6.

The Universe of Music Theory: Music Masters

This Chapter explores several game design concepts, and options in the form of mechanics, dynamics, and aesthetics that comprise the proposed role-playing game (RPG) entitled, the *Universe of Music Theory* (UoMT). The additional suffix "Music Masters" conveys the player's main objective: to become a Music Master. Morton states that "[Music Education] is a subject specific culture of teaching and learning, focused on developing musicianship in one form or another and isolated from other academic domains and other artistic studies."[335] The first issue in making a game is to address the game's main activity. In this case, music theory, keyboard skills, and aural skills have been transformed and integrated into systems of combat and exploration. The UoMT will focus on developing musicianship while also including other academic domains (music academia, the natural and scientific phenomena of sound and music, and the psychology of music). To view the addressed issues and benefits of the UoMT from Chapter Two, please view Appendices B and C.

When purchasing the game, one may also need to purchase a MIDI keyboard and a microphone due to the integration of MT, SRET, and KBS. These requirements facilitate the gameplay and opportunities for business partnerships. Further research and development may be explored regarding the utilization of other MIDI instruments (saxophone, clarinet, flute, etc.). The recommended performance setup would involve a desk with a retractable lower shelf. The monitor, QWERTY keyboard, and mouse would rest on top of the desk as normal and the MIDI

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[335] Charlene A. Morton, "Music Education for "All My Relations"," in *The Oxford Handbook of Philosophy in Music Education*, ed. Wayne D. Bowman and Ana Lucía Frega (Oxford: Oxford University Press, 2012): 472-492. https://doi.org/10.1093/oxfordhb/9780195394733.013.0025.

keyboard would rest below on a shelf that can be pulled out towards the player (for combat, puzzles, and challenges) and pushed back in when needed; or some variation of this set up.

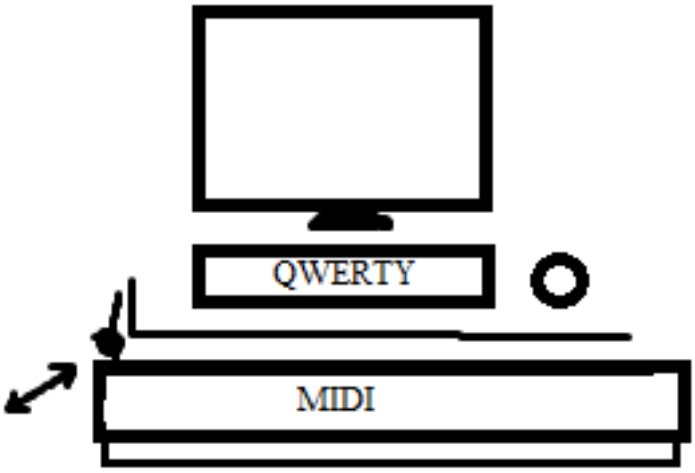

Figure 4.1. The recommended MIDI setup for efficient gameplay and learning.

The 2D or 3D Game Design

A 2D perspective would require less resources, work hours, money, time, and require less performance capability of the student's computer. The 2D game design may facilitate a shorter period of development and more accessibility to students due to lower demands required of one's computer. However, a 3D design may facilitate greater popularity, a higher level of depth, and greater aesthetic appeal to a broader audience. The game may exist with either design. The player characters will aim for a charming appeal (a low-poly art style for a 3D design or top-down pixel art for a 2D design).

The Plot

The player begins their humble journey in the world of C Major. A request has been put out that the King of the C Major kingdom is enlisting new court musicians. However, to become a court musician, the player will have to pass several music core-based tests to qualify for the audition. On the player's journey, the Dissonance appears and disrupts the harmony of the kingdom. Over time it will be revealed that coexistence with the Dissonance is possible. Once the player and the other musicians lead the way in fighting the Dissonance and they defeat the game's first world boss, the King of the C Major kingdom grants the player his seal and letter of recommendation. This seal, he tells the player, will give them a level of acknowledged musicianship in the following worlds: F Major, G Major, and less credit in A minor and C minor. Thus the player's journey of musicianship, to become a music master continues as they continue to learn about more music theory concepts and music-related subjects.

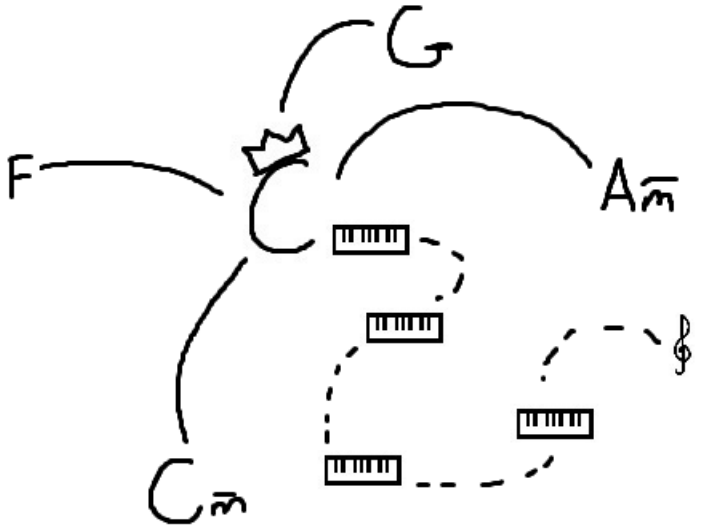

Figure 4.2. The Player's Journey. Each keyboard in their path is a game-based activity or challenge (exam) that will prepare them to be a court musician in the kingdom of C Major. From C Major, the player may modulate to F major, G major, A minor, and C minor. In each of these new worlds, the journey begins again, reinforcing old concepts and introducing new ones.

The Player

Players may customize their character's starting appearance in terms of body dimensions (height, width, muscle, etc.) as much as 2D or 3D designs will allow. It is important to note that steps will be taken to ensure that game models remain modest and not provocative or revealing to maintain ethical values and safety should the game be suited for a middle or high school audience. Players will be able to unlock different aesthetic character effects that will alter the way their characters look such as having a big head or becoming transparent. These are merely for aesthetic/visual purposes to maintain an aspect of fun.

Any character the player makes can be transitioned between Single Player, Classroom, and Multiplayer Servers. The Single Player Server is for offline access or local area network (LAN) multiplayer. The Classroom Server is specifically designed to only be played with classmates and potentially only for the duration of the two-year music theory core curriculum. The Multiplayer Server would aim to be a complete MMO experience where players from all over the world can join on a number of different region-based servers (U.S. West/East, Europe, South America, etc.) to account for different regions and as to not destabilize or overrun one server with too many players and login requests. To reduce "Player Clutter," the cluttering of too many players and name tags on the screen, there will be an option to only show "Friends," "Classmates," and "Ensemble Members." Alternatively, due to the immense costs of a MMO, multiplayer servers may be set to hold between twelve to one-hundred players or less.

Player Movement and Interaction

Movement in the game will consist primarily of using the keyboard (WASD or arrow keys). Interactions within the game will consist of primarily mouse controls. However, some interactions (solving puzzles, uncovering secrets, and participating in music core-based combat)

may also involve using a MIDI keyboard or QWERTY keyboard substitute. The integration of controller-based movement will also be considered.

Choosing Your Tessitura

One of the most captivating parts of a game aside from its combat system is its weapon system. In this game, the player's weapon is their instrument and referred to as their "Tessitura." One's Tessitura is their "basic melodic range."[336] That is, the distance from one's lowest possible note to their highest possible note including every note in between (see Figure 4.3).

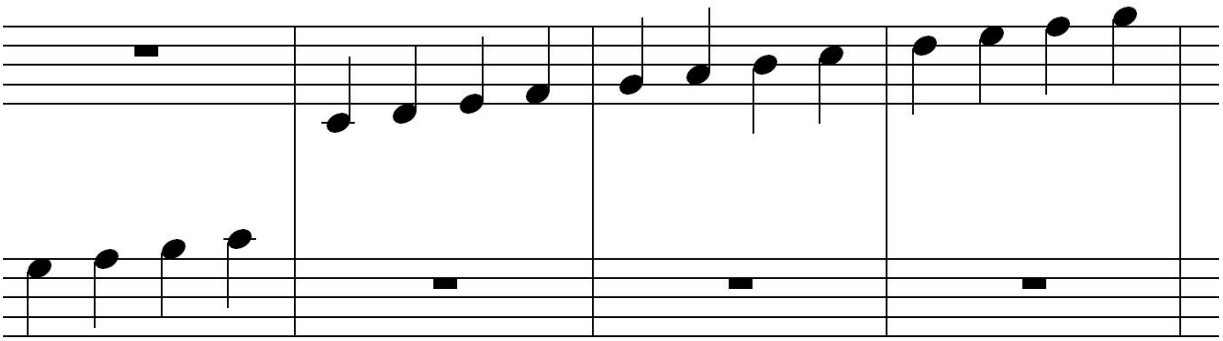

Figure 4.3. The Tessitura. An example of one's Tessitura (vocal range) from G3-G5.

After the player creates their character and enters the game, they will choose their performance instrument or "Tessitura." The Tessitura is the UoMT's equivalent to having weapons (swords, bows, staves, etc.) and classes (Warrior, Mage, Rogue, etc.) During battles against "The Dissonance" (the main enemy in the game) or even to solve puzzles and challenges, one must learn to balance their sound with their allies as a real-life musician would with their

[336] Elizabeth A. H. Green and Mark Gibson, *The Modern Conductor 7th Ed.* (New Jersey: Pearson Prentice Hall, 2004): 190.

ensemble. There will be a volume and an intonation meter for players to adjust before and during combat. In like manner to real-life performances where the temperature and environment of performance locations are considered and affect tuning precision, the environment and temperature of the battlefield (and other physics-related concepts dealing with how sound travels) will also be a factor affecting how difficult it is to adjust the tuning meter (as seen in the "Tuning" sub-section). This is because, in real-life, the temperature and environment of performance locations are taken into consideration.

Kinds of Tessitura

During the early development and release of the UoMT, the only instruments choices available will be those of the Western Tonal System (piano, violin, cello, clarinet, flute, saxophone, marimba, bass drum, etc.). Instruments from different regions and cultures of the world may be added in the future. If one chooses "The Voice" as their starting Tessitura, then they may advance to increase their register range. If one chooses an instrument, then they may advance to an instrument of the same family (i.e., tenor, alto saxophone) or a different family (tenor saxophone, flute).

Percussion Tessituras (other than the piano) are unique. While percussion players will have access to the virtual keyboard like any other player for chord challenges, they may have more rhythm based challenges proposed to them. Furthermore, percussion players may be tasked with providing a specific rhythm pattern throughout the game and the sheet music they see may be entirely different than the sheet music presented to the rest of the ensemble. For example, the percussion player may be given a drum line where they use the bass drum, snare drum, and crash cymbals. This will coincide to the tension chords being played and resolved wherein, if everyone

performs “in time” (resolving the tension chord + rhythm) they will be heard as playing together similar to performing a piece of music in real life.

The Music Encyclopedia

Choosing a Tessitura facilitates learning the instrument’s fingering chart. While there is no exact way to replicate the physical placement of one’s hands and fingers on their instrument in real life (without the assistance of an electronic/MIDI controller or instrument such as a guitar for *Guitar Hero*), memorizing the fingerings is a close second and still an important asset for musicians. The UoMT will facilitate challenges to level up one’s Tessitura that involve identifying the notes-to-fingering chart. The UoMT will include an in-game, sequentially unlocked or “discovered,” encyclopedia of note fingerings on various different instruments and the effects of temperature and embouchure on the instrument. These discoveries will occur and be recorded as the player experiences them. This mechanic will be further incorporated to teach players about real-life music history, pedagogies, philosophies, and phenomena.

The Music Theory Toolbox

Along with choosing one’s Tessitura, student’s will also start the game with their own “Music Theory Toolbox.” Every time a compositional or music theory-related concept is learned/mastered it will be stored in the toolbox. Players can revisit their toolbox and hover over their tools/badges to see an example of how to employ those tools in a “real-world” situation. Students will use these tools to solve challenges and puzzles. The tools/badges will represent different tiers of mastery in the semblance of bronze (beginner), silver (advanced), and gold (master). These tiered badges will give players something to strive for when completing music core challenges.

Tuning

Tuning the player's Tessitura will represent the necessity of tuning one's instrument in real life. Before every combat or challenge demonstrating the necessity to tune before every performance. In the game, players are making music. They are in a sense, performing over a virtual platform.

When tuning, a dial similar to most tuning applications, will appear on screen. Students with a microphone can use their microphone to hit the concert-pitched note either with their aural skills (voice) or with their (real/MIDI) instrument. Students without a microphone (or as a fun alternative) will need to rapidly press the left and right arrow keys to bring the pointer in their dial centered to the Tuning Note (see Figure 4.4). The player will begin tuning as being more sharp or flat based on the climate conditions of the map they are in as well as other conditions that are involved in determining this factor in real life.

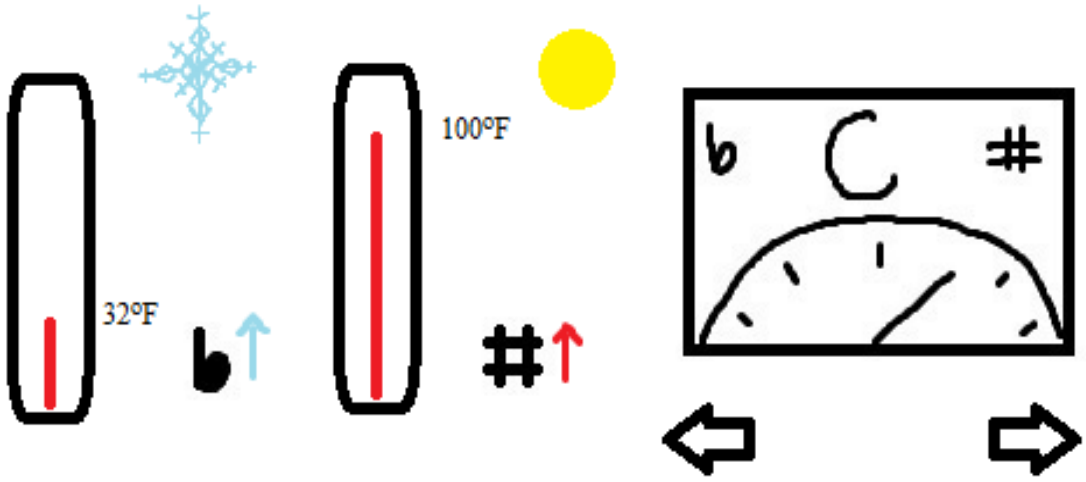

Figure 4.4. The Tuning Dial. This represents how tuning, the phenomena of the speed of sound in air decreasing (causing the instrument to be flat) or increasing (causing the instrument to be sharp), may be represented as a minigame.

Players will also need to decide on which note to tune to. Each kind of enemy (Dissonance) may bring different battle conditions to the combat. In this way, tuning to a certain note may make an impact on the damage done to the Dissonance. For example, if the player knows that the Dissonance will be in the key of G major, then they may choose to tune to G, C, or D major or E minor depending on the skills and abilities they have chosen from their Tessitura and Musicianship skill trees. Students may also decide to specialize in secondary dominants. In combat, this would mean that in addition to resolving the tension chord, they may first play the V/V - V of that chord, and then play that chord for an amplified Resolution Effect or damage amount. Furthermore, combat bonuses may be given to players who perform together using the same skill tree specialization (water, ice, fire, lightning, light, resonance, force, etc.) and bonuses given between skill trees. Players maintain the option to re-tune mid-combat; however, re-tuning will need to be done in time before their turn as the notes on the sheet music will not wait for them if they take too long.

Loot, Equipment, and Pets

The rewards for completing challenges can be in-game currency, progression in a story/quest, in-game outfits, emojis, actions/poses, other aesthetics, and most importantly musicianship and Tessitura experience points (“exp” or “XP”).

Another common feature for many RPGs is the concept of equipment. Perhaps one of the most exciting features of any RPG is to find, collect, and earn new pieces of stronger equipment. Equipment normally scales in tiers of rarity and strength depending on the player’s level. When the player is equipping these items onto their character, there are normally “equipment slots.” Examples of equipment slots may include helmet, armor, leggings, shoulder pads, gloves, shoes, capes, rings, necklaces, and the like. Part of the “strength” of equipment is often labeled as

“attributes.” For example, in addition to providing armor for the character, the armor may contain special attributes that increase other stats of the player (speed, attack, defense, etc.).

There are two aesthetic features of equipment. The first is that in most RPGs, the equipment that a character equips changes the visual display of what that character is wearing. The second is an idea that revolves around an aesthetic layer of equipment. The equipment that keeps the player strong may not look very appealing. Therefore, many games utilize this aesthetic layer of equipment wherein the character can maintain a level of aesthetic appeal. The UoMT will maintain this dual-featured equipment aesthetic.

Transcriptions

Most RPG games have a feature called “socketing” or “enchantments” on armor and weapons. These are effects that increase the statistics (stats) on equipment or provide special attributes to the equipment. Due to the nature and wording of these features (socketing runes or enchantments), this game will take a different approach. Players will be able to transcribe intervals onto their equipment. Each interval, P4, 5, 8, M/m 2, 3, 6, 7 or some tritone, will apply different stats and having intervals that make up chords such as a M3, P5, and P8 together, which spell a major triad, will give chord effects to the equipment. Each piece of equipment, depending on its function (helmet, chest plate, leggings, shoulder pads, braces, boots, etc.), rarity (common, uncommon, rare, epic, and legendary), and tonality (major, minor, diminished, and augmented), will have a different set of intervals able to be applied.

Furthermore, the inverse of interval spelling can be applied once unlocked to result in another boost of stats. The transcribed notes or intervals on one’s equipment can be relevant or “in harmony” with one’s musicianship skill tree choices. For example, some skill tree paths will emphasize major, minor, diminished, augmented chords (triads, seventh chords, or chord

extensions). These aspects will be emphasized during Chord Resolution Effects (see the Combat and the Dissonance subsection).

Overtones may also be transcribed or unlocked. This means if one transcribes a “C” note on their Tessitura or piece of equipment, at a certain level, the player may unlock the knowledge of overtones. Overtones enable one’s equipment to become stronger because of the new combination of tonalities and harmonies now realized.

Equipment may also have prescribed suffixes and prefixes that determine some special attributes. These suffixes and prefixes will be based on real-life music theory, physics of sound concepts as well as other “music and the brain” studies. For example, “Sonoluminescent Leggings of the Major/Minor/Diminished/Augmented/Perfect I/ii/iii/IV/V/vi/vii^{o} Triad/Seventh Chord” or “Frost Quake Helmet of the Minor Third Degree.” Each item of equipment will also contain “lore” (backstory information) descriptions that briefly teach about the real-life concept.

Pets

Another common feature in many RPGs is the concept of having a pet. Many times pets are merely aesthetic in nature. Other times, pets may aid the player in combat. In the UoMT, pets are currently only planned to be used for aesthetic purposes and Baby Dissonances may used as pets after reaching a certain level. This is to represent that ultimately, dissonances are not always “bad.” In fact, dissonance and resolutions can be and are part of many historic and modern compositional techniques.

Ensembles and Guilds

Most RPGs use the term “party” to refer to a group of 4-8 players taking on the same task together. However, in the UoMT, this will be termed as an “ensemble.” This is because, in the world of classical music performance, that is what you would call a group of musicians performing together.

In standard RPGs, there exists a term and concept called a “guild.” A guild in most games is a group of adventurers, warriors, mages, archers, soldiers, scholars etc. In this game, the concept of a guild will be continued except, it will be a musician’s guild. Furthermore, depending on the world and era of a world, the guild will be called by different names. For example, the term guild is an actual term from the medieval era. However, in the modern day NAFME and associations like NAFME or music coalitions are very similar to the idea of a guild. Therefore, within the game, when a player makes a guild, they will get tasks from the King to take censuses from the music schools. This is a way to introduce Music Advocacy and annual status reports (ASR). Players will stand before a council whose goal is, for one reason or another (resentment, ignorance, etc.), to promote science and mathematics and cut music education. They will have to properly fill out the templated, the formulas, understand FTE in order to make their case. They will also learn about music administration (scheduling music and arts; teacher evaluations; annual calendars; strategic plans).

The Worlds in the UoMT

Players will start in the world of C major. After they unlock or prove their proficiency over enough music theory concepts, they can go to neighboring worlds such as, A minor, C minor, F major, and G major. These specific worlds correlate to the player learning about relative minor scales, pre-dominant, and dominant chords.

Every scale represents a different world in the *Universe of Music Theory*. For now, there are planned to be twenty-four worlds (12 major and 12 minor). The inclusion of modes Ionian, Dorian, Phrygian, Lydian, Mixolydian Aeolian, and Locrian may be implemented as the seven moons of each world, as special locations on each world, or as their own worlds with a minimum of twenty-four different locations representing the combinations of major and minor scales performed in each mode. Harmonic, melodic, and natural minor scales may also be present as moons or as special locations. Other scales such as pentatonic, whole-tone, and octatonic scales may also be their own worlds or locations

Different temperaments, styles of playing, and knowledge of music theory is needed to traverse these worlds. Each world will have some similar areas that can build off students' knowledge of previously learned material.[337] For example, every world will have its relative minor and other intervals that represent kingdoms/nations. The biggest kingdoms/nations in power are the I, IV, V, and vi. Although in some major/minor worlds, this can be different. Smaller kingdoms are allies of these bigger powers in order of their relevance to the Tonic-Subdominant-Dominant-Tonic (TSDT) relationship. Within each kingdom, secondary dominants, pivot chords, and enharmonic relationships will also be represented as nobilities.

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[337] Cassidy, "Music-Games," 119; Nilson, *Teaching at Its Best*, 269.

Worlds may also be set in different time periods. For example, the rules of music theory, composition, and performance have historically changed depending on the era (Medieval, Renaissance, Baroque, Classical, Romantic, 20th and 21st Century). In like manner, the rules of music theory within worlds of other eras will correlate to the common convention rules of that time period. Players may need to re-learn their theory and adjust their instruments.

World Composition and Design

Each world will combine a mixture of terrain, locations, and biomes with music theory-related concepts. This compositional form creates a nearly limitless number of locations for each world (see Table 4.1). Each location with the same concept name reinforces the music theory concept. Every reiteration of music theory material will require fresh graphics, story lines, enemies, puzzles, and combat challenges. Many of these requirements may be facilitated through focusing on a new "home key" (C Major, F Major, G Major, A minor, C minor, etc.).

	Treble Clef	Bass Clef	Pivot Chord Modulation	Enharmonic Modulation	7th Chords	Augmented Sixth Chords	Sonata (Form)	T-S-D-T	Counterpoint
Valley	T.C. Valley	B.C. Valley	Pivot Chord Valley	Enharmonic Valley	7th Chord Valley	A6 Valley	Sonata Valley	Tonic Valley	Counterpoint Valley
Fields	T.C. Fields	B.C. Fields	Pivot Chord Fields	Enharmonic Fields	7th Chord Fields	A6 Fields	Sonata Fields	Tonic Fields	Counterpoint Fields
Hills	T.C. Hills	B.C. Hills	Pivot Chord Hills	Enharmonic Hills	7th Chord Hills	A6 Hills	Sonata Hills	Tonic Hills	Counterpoint Hills
Mountains	T.C. Mountains	B.C. Mountains	Pivot Chord Mountains	Enharmonic Mountains	7th Chord Mountains	A6 Mountains	Sonata Mountains	Tonic Mountains	Counterpoint Mountains
Peaks	T.C. Peaks	B.C. Peaks	Pivot Chord Peaks	Enharmonic Peaks	7th Chord Peaks	A6 Peaks	Sonata Peaks	Tonic Peaks	Counterpoint Peaks
Caves	T.C. Caves	B.C. Caves	Pivot Chord Caves	Enharmonic Caves	7th Chord Caves	A6 Caves	Sonata Caves	Tonic Caves	Counterpoint Caves
Canyons	T.C. Canyons	B.C. Canyons	Pivot Chord Canyons	Enharmonic Canyons	7th Chord Canyons	A6 Canyons	Sonata Canyons	Tonic Canyons	Counterpoint Canyons

Table 4.1. Content Focused World and Locations. This figure represents a sample combination of music theory concepts and locations/terrain.

The World of C Major

The following Figure 4.5 is a map depiction of the first world, C Major.

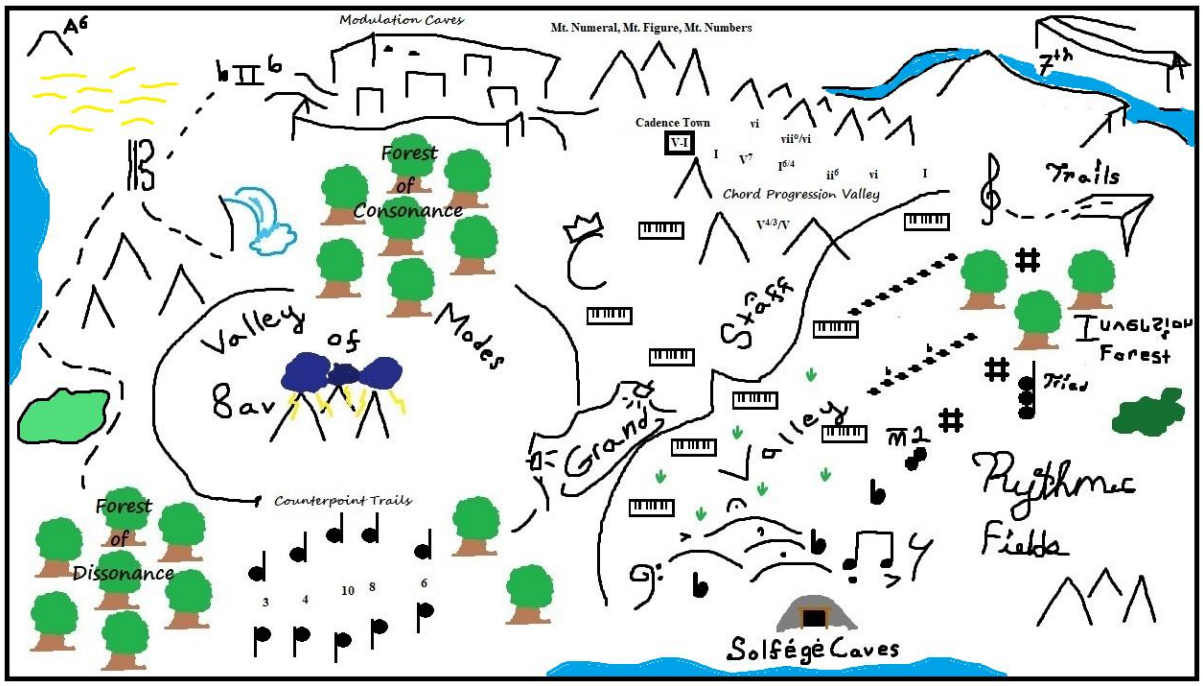

Figure 1.5. The World of C Major. This map represents sample of the C Major "world" or "kingdom."

The player begins in Minor Second village, represented by the m2 on the lower, mid-right side of the map. Minor Second village ("m2") is located within Grand Staff Valley (GSV). GSV is also home to many other basic music theory concepts such as major and minor scales, articulations, note identification, and triads. Players will get to choose their path from the GSV. They may go north to Treble Clef city or south to Bass Clef city. To enter the capital of C Major city, players will need to pass the music competency exams at each location represented by a keyboard. These competency exams will require players to explore the kingdom of C Major and

learn several music theory, SRET, and Keyboard skills concepts before they are able to gain entrance to the city and audition for a spot as a court musician for the C Major king.

From Treble Clef city, players may go to Treble Trails, Seventh Chord Gorge, and enter Chord Progression Valley. This valley leads players through learning a variety of standard learned chord progressions and will require students to revisit this location as they progress in their knowledge of MT. After spending some time in Cadence Town, players may make a visit to Mt. Numeral, Mt. Figured Bass, or Mt. Nashville. These locations will teach players about the different kinds of music notation—in this game, Roman Numerals, Figured Bass, and Nashville Numbers. Players may continue from Cadence Town to the Modulation Caves where they will learn about modulation techniques such as pivot chord and enharmonic modulation. Upon exiting the Modulation Caves, players encounter the Neapolitan Desert. In this area they will learn about Neapolitan (bII) chords and how to resolve them. From here they may continue to Alto Clef city or visit the Augmented Sixth Volcano.

From Bass Clef city, players may travel through the Counterpoint Trails that will teach them about first species counter point. From here they may visit the Valley of Modes, the Octave Peaks, or the Forest of Dissonance. The Valley of Modes will serve to introduce the seven modes to players. Octave Peaks aims to familiarize students with further staff notation. The Forest of Dissonance is home to the first world boss.

Background Music

Most games incorporate theme songs to their fictional cities and locations. Some serve as simply background music others identify icons of a certain location or the entire game. In the UoMT, the aim will be to use as many pieces of classical and jazz music as are mentioned in the classical and jazz history courses that students may take in future courses or may be currently

taking. In this way, the UoMT may facilitate a fun form of motivational informal learning and preparation.[338]

World Travel

When selecting another world to travel to, players will see a map as shown in Figure 4.6. By clicking on another world, such as F Major, it will then display the I, IV, V, vi, and relative minor from the perspective of F Major. In this way, players can explore the family relationships between each key. Further exploration can be done by zooming out or moving up, right, down, and left. These movement options will show the players the "universe of music theory" according to C Major or whichever world they are currently in. The current world is depicted as the center of the universe. This map design was chosen for its creative approach. The Universe of Music Theory is a fictional universe and does not necessarily depict the author's view regarding life, religion, politics, or anything of the sort. All figures and explanations are for the recreational, entertainment, and educational purposes of providing a fun and engaging method of learning, reviewing, and discovering music-related concepts.

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[338] Taheri, Morteza, Sharareh Motealleh, and Jalil Younesi. "Workplace Fun and Informal Learning: The Mediating Role of Motivation to Learn, Learning Opportunities and Management Support." The Journal of Workplace Learning 34, no. 3 (2022): 229. https://www.emerald.com/insight/content/doi/10.1108/JWL-05-2021-0062/full/html; Beng Huat See and Lindsay Ibbotson. "A Feasibility Study of the Impact of the Kodály-Inspired Music Programme on the Developmental Outcomes of Four to Five-Year-Olds in England." *International Journal of Educational Research* 89, (2018): 12. https://www-sciencedirect-com.ezproxy.liberty.edu/science/article/pii/S0883035518302696?via%3Dihub; Eva Kyndt, David Gijbels, Ilke Grosemans, and Vincent Donche, "Teachers' Everyday Professional Development: Mapping Informal Learning Activities, Antecedents, and Learning Outcomes," *Review of Educational Research* 86, no. 4 (2016): 1111–50. http://www.jstor.org/stable/44668245.

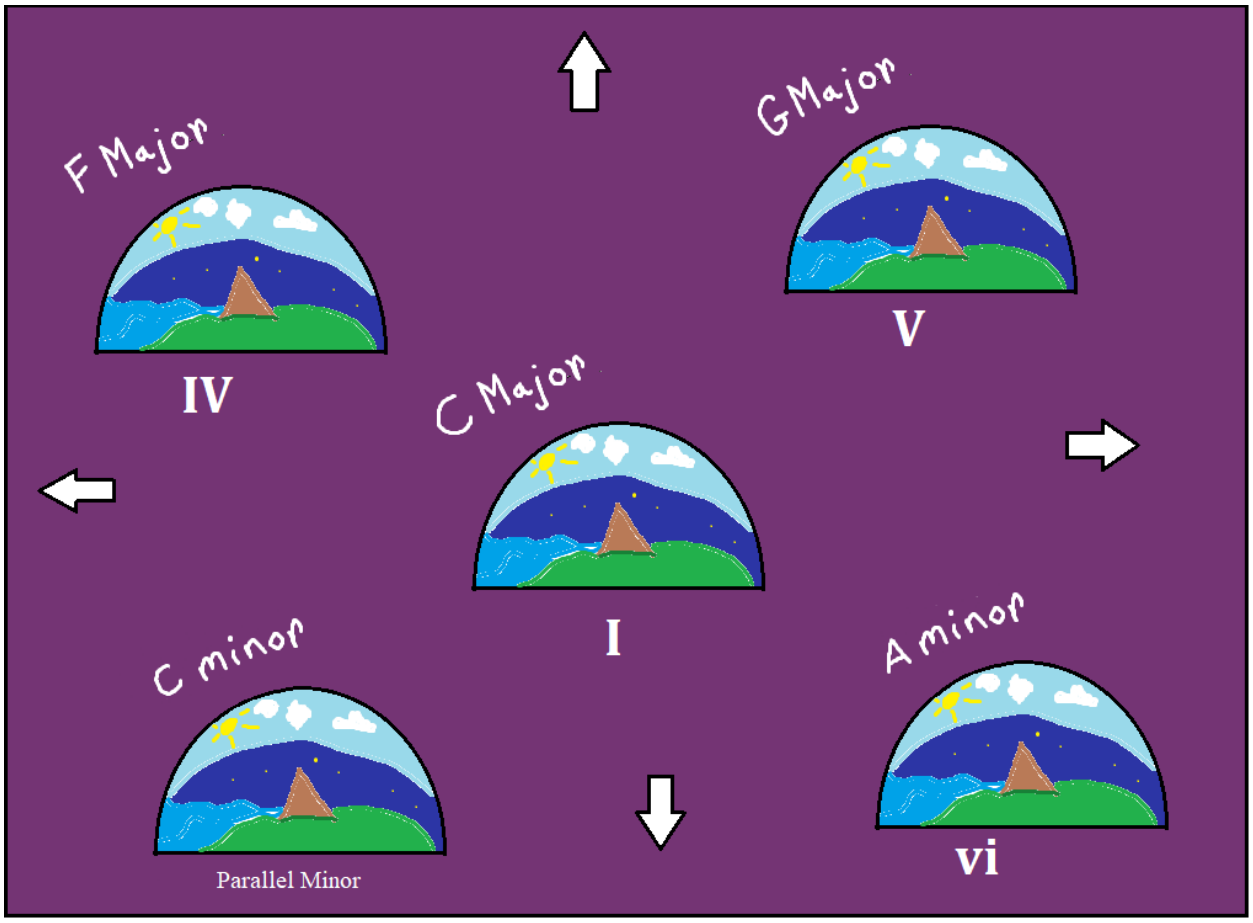

Figure 2.6. World Travel. This demonstrates the concept of what it will look like when the player is looking at "the universe of music theory" and deciding which world to travel to. The actual in-game view will be done professionally and have more aesthetic appeal than this demonstration. When hovering over a world, a chord in the key of the world is played.

Once the ensemble has decided on the world they want to travel to, a new screen will appear as shown in Figure 4.7. On this screen each player will be represented by spaceships that will have a bouncy collision effect, similar to how one might imagine bumper cars are in real-life. The spaceships are highlighted with different colors for players to tell them apart; as well as displaying the player's nametag beneath each spaceship. Each player is given a starting chord. Here, players have the freedom to go into any hoop they desire in order to continue their chord progression. They may also enjoy a light-hearted game of bumper ships as each player struggles

against one another in their own attempts to build their chord progression. At the end of the transition, when the players are ready to enter the chosen world, the chord progressions are saved as midi sound files into an in-game library. The player can listen back to and see the roman numerals of any flying chord progression that they have previously completed.

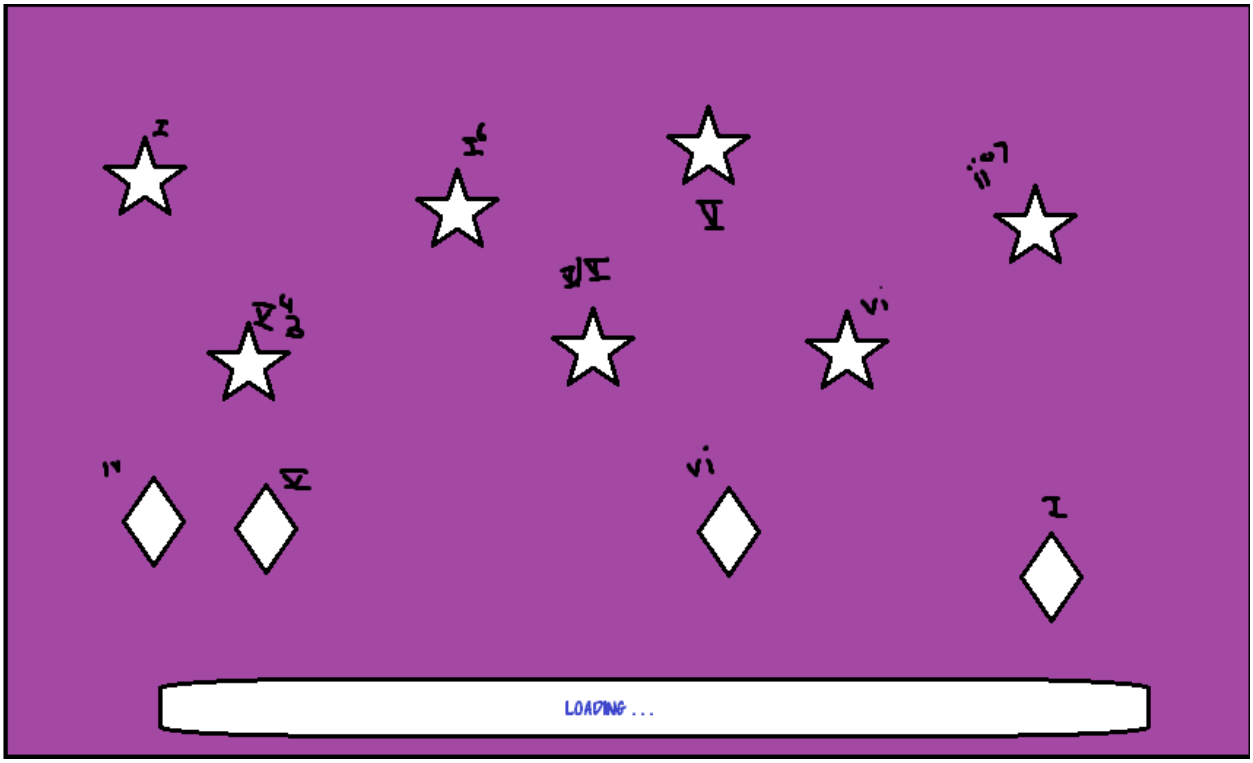

Figure 4.7. World Loading. This figure demonstrates the concept of the player(s) loading when traveling to a different world. The diamonds represent the members of the ensemble in their spaceships. The roman numerals next to them represent their starting chord. The stars represent hoops that players can pass through to continue their chord progression. The actual shape of the spaceships can be changed to different note sizes, dynamics, or other punctuations and have trailing effects.

Heroes, Villains, and NPCs

Due to the importance of music philosophy in music education and in all human matters, Reimer advocates for developing competencies of philosophical thinking in the early grades, entry level, and through doctoral studies.[339] Therefore, the UoMT will utilize heroes, villains and non-playable characters (NPCs) to propose the same questions uttered by Tolstoy, Meyer, and Hanslick and many other music philosophers and cultures: “What is Art?”, “What makes music beautiful?”, “What makes music valuable?”, and “What is the purpose of music?”[340, 341, 342] In this way, the awe and wonder of music may be represented in the form of music philosophy applied on a grand scale. The UoMT will make mention of real-life philosophers and have NPCs as heroes or villains who follow these philosophies to the extreme. These references will create a lasting impact on players and increase the chance of players understanding these music philosophies as they will be presented in game-form with theatrics, song, and grand aesthetics.

One example of this is Ficino. “Ficino’s aim was to recapture the healing effects these magi were thought to have achieved through singing and incantation, such as curing diseases of the soul and body, removing evil desires, and bringing the soul “into a state of virtuous

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[339] Bennett Reimer, "Uncomfortable with Immanence: The Nature and Value of Music and Music Education as Singular or Supplemental," in *The Oxford Handbook of Philosophy in Music Education*, edited Wayne D. Bowman and Ana Lucía Frega (Oxford: Oxford University Press, 2012): 126. https://doi.org/10.1093/oxfordhb/9780195394733.013.0006.

[340] Leo Tolstoy, *What Is Art?*, trans. Aylmer Maude (Urbana, IL.: Project Gutenburg, 1904), 210. https://www.gutenberg.org/cache/epub/64908/pg64908-images.html.

[341] Leonard B. Meyer, *Emotion and Meaning in Music*, (Chicago: The University of Chicago Press, 1961), 1. https://hdl.handle.net/2027/heb06267.0001.001.

[342] Lee Rothfarb and Christoph Landerer, *Eduard Hanslick's on the Musically Beautiful: A New Translation* (Oxford: Oxford University Press, 2018), 129. ProQuest Ebook Central. https://ebookcentral.proquest.com/lib/liberty/detail.action?docID=5434449.

harmony."[343] Ficino believed the healing power of music to be given to Adam from God and carried out as a secret knowledge passed down to magi. Ficino also attempted to answer the questions on the source of music's power by connecting them to the "principles of vibration explained in Ptolemy's Harmonics (second century A.D.)."[344] Ficino's philosophy attributes music to God and acknowledges the divine origin of music; healing properties to music; and appears to be a form of mysticism, which is a debatable topic outside the scope of this dissertation and worthy of its own.

An NPC based on the teachings of Ficino may set up a secret society specializing in music therapy. The leader of this "Ficino Society" may attempt to capture the essence of music (an extravagant term used in-game to represent sound and harmonies) and utilize this "power" to restore the balance of music to the universe and healing to the souls of men. While this NPC's attempts will appear noble, ultimately, the Ficino Society will fail at their attempts and perhaps meaning good, will cause more dissonance to appear. The Ficino Society may contain lore (in-game histories and backstories) that relate it to the writings of Hildegard Von Bingen and other philosophers who acknowledge the biblical origin of music and the claims of the ancient world and civilizations that "music had great power over human morals and behavior."[345]

Other historical issues and philosophies such as the proper way for humans to approach the divine; the role of music in worship and in life in general; the quest for the source of music's

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[343] Diane Thram, "Understanding Music's Therapeutic Efficacy: Implications for Music Education," in *The Oxford Handbook of Philosophy in Music Education*, ed. Wayne D. Bowman and Ana Lucía Frega (Oxford: Oxford University Press, 2012): 197. https://doi.org/10.1093/oxfordhb/9780195394733.013.0011.

[344] Ibid.

[345] Thram, "Implications for Music Education," 197.

power over morality and ethics; the ideas of proportion in nature espoused by Pythagoras; and the mathematical principles of vibration explained in Ptolemy's Harmonics (second century A.D.) will be explored through similar means of heroes, villains, and NPCs.

Combat and The Dissonance

Combat against "The Dissonance" (the main enemy of the game) takes place as an ensemble, or solo battles. When Combat is initiated the rules of the challenge will be presented to the player(s). There are eight kinds of combat that will be discussed: music theory duel, accompanist challenge, ensemble challenge, rhythmic challenge, counterpoint challenge, dictation challenge, free-form bubble combat, and boss battles.

Categories of Dissonance

Categories of Dissonance will resemble the kinds of dissonance that students learn how to resolve in music theory courses. Those include: Major or minor seconds, suspension, 7^{th} chords, dominant chords, diminished and augmented 4ths and 5ths, tritones, chord extensions, and more. The Dissonance will take the appearance of note heads. The more difficult the challenge, the more elaborate the note head design will take. Their category will be stated plainly or ambiguously as their nametag (see Figure 4.8). The Dissonance may contain arms, hands, feet, legs, or they may bounce or hover around. As some dissonance can sound beautiful (i.e., a DM7 chord), the tone quality will be reflected in their appearance. When interacted with or taking damage, the Dissonance will sound out their tonal qualities.

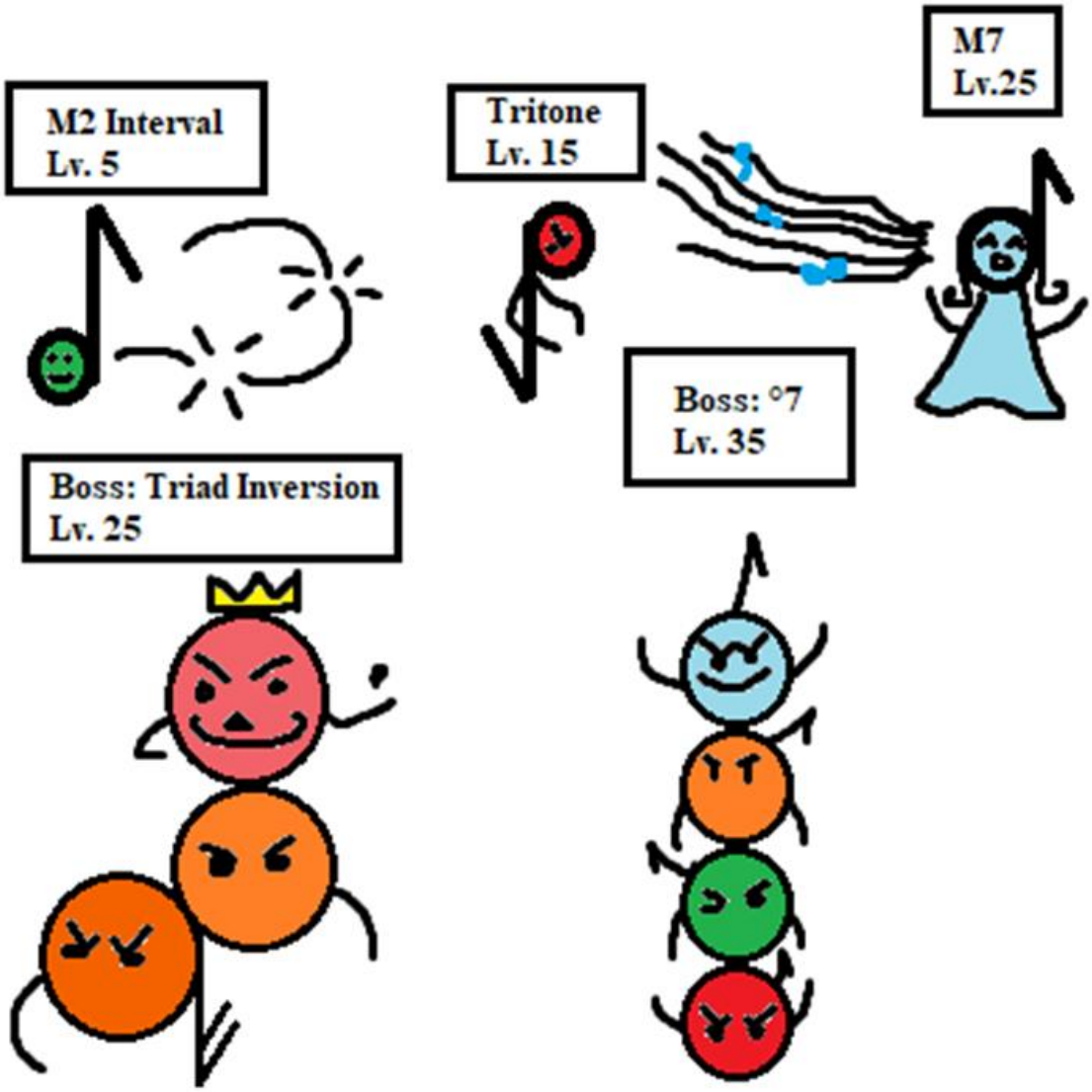

Figure 4.8. The Dissonance Enemy Types. The dissonance design on the top left is a baby dissonance that bounces around representing an easier music theory concept. The dissonance in the top middle is a meaner looking design represented by the tritone quality. The dissonance design on the top right is more beautiful based on the M7 chord quality. The design on the bottom left is a Boss (assessment) for Triad Inversions. The design on the bottom right is a Boss for fully diminished 7^{th} chords. These bosses and body shapes of the Dissonance designs are meant to resemble the actual notation that would be seen on sheet music. The stems can indicate the level of subdivision. Further rhythmic notation can be included such as dots, ties, fermatas, etc. This image was designed in Microsoft Paint and serves to showcase how noteheads can be incorporated as enemy designs. The levels and designs here are merely for demonstration purposes and are subject to change.

Music Theory Duel

A Music Theory Duel, the most common battle-type is where The Dissonance provides tension chords for the player(s) to resolve (see Figure 4.9). Resolving the dissonances correctly (with the correct spelling) when the tension chords reach the highest tension point will result in dealing damage to the dissonance that produced the chord. Resolving the dissonances early, may result in either more damage or less damage depending on either the enemy type or other restrictions put in place during the duel. This is to provide some contrast and challenge when fighting enemies. The tension chord can be presented to one player, or to multiple members of the ensemble. Once the enemies' hit points ("hp") are brought down to zero the players win the combat and gain both Musicianship and Tessitura experience (exp). These concepts are important to remember for later when discussing Leveling Up.

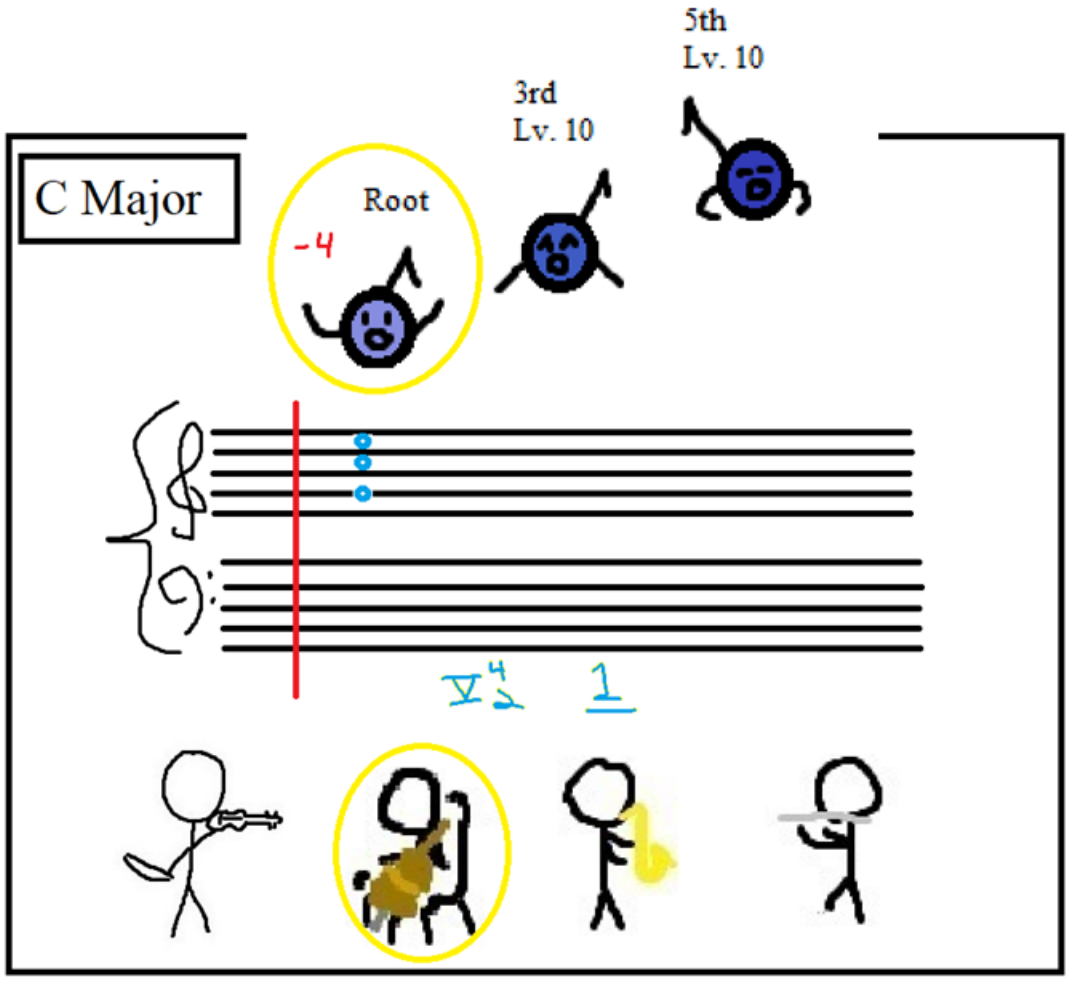

Figure 4.9. Music Theory Duels. The players are on the bottom and the dissonance are on the top. The circled characters represent the dissonance who is proposing a chord progression and the player who is answering the call to resolve the chord progression. In the middle is the "Sheet Music." The Sheet Music tells the player which chord they are resolving, and in which range the desired resolution is in. The red line represents the "Tension Point." The Tension Point is the metrical deadline in which the player must resolve the challenge before taking damage. Chords and RN, FB, and NN, on the Sheet Music are scrolling toward the Tension Point. The "-4" by the "Root" represents that when a chord is performed or resolved, the dissonance that proposed that chord takes damage. Damage dealt will depend on timing, chord accuracy (spelling), and the player's Tessitura range.

Accompanist Challenge

While the main way to combat the Dissonance is by resolving tension chords, players may be presented with other challenges as well. The Accompaniment Challenge consists of one player being the soloist and the other 1-3 players of the ensemble being the accompaniment. In this challenge, the accompaniment players are given a series of chord progressions and the soloist must perform over them. The non-chord tones that the soloist plays must be resolved according to the common practice conventions of music theory. Otherwise, the soloist will take damage. If an accompanist plays the wrong note, the whole team will be damaged. However, unlike the normal Music Theory Duels where a player resolves the tension chords by pressing multiple keys on their MIDI piano, the player will be responsible for pressing only one key as designated by their Tessitura following SATB format and the music theory rules of doubling. Icons will be placed next to each player to help them understand their position in the ensemble. For example, the instrument with the lowest Tessitura will perform the bass notes.

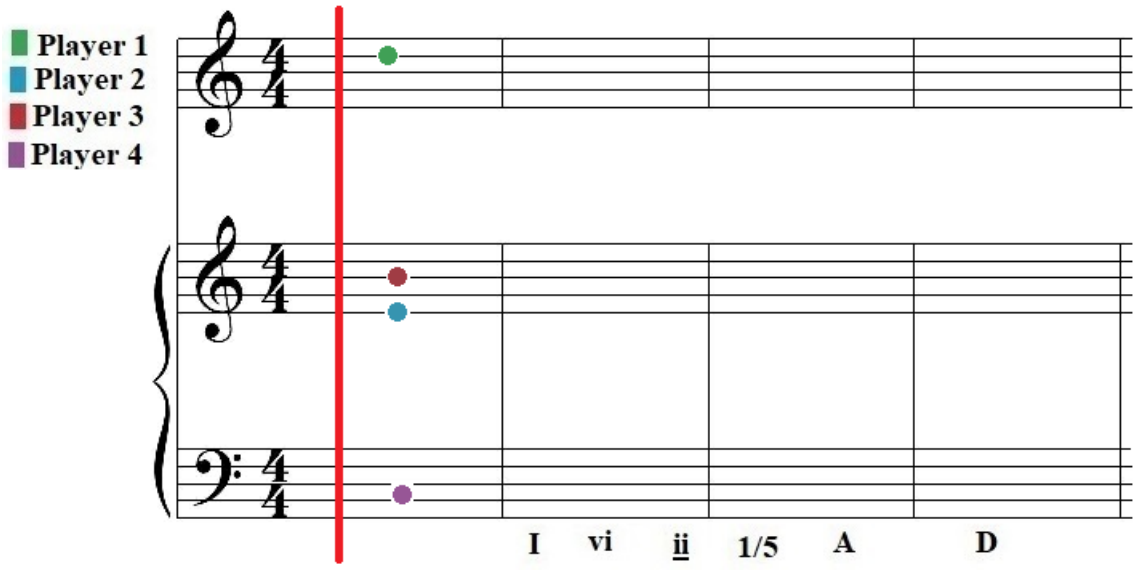

Figure 4.10. Accompanist Challenge.

Ensemble Challenges

Ensemble Challenges require all members to participate in performing a single note that is involved in resolving the tension chord (see Music Theory Note Heads minigame). Attention must be paid to doublings. Some challenges require the students to continue the proposed chord progression into a diminished chord. In such cases, and in other cases, players will need to know the rules on doubling in order to do the most damage and not receive any backlash damage. Ensemble Challenges have the potential to damage all the dissonances if resolved successfully, or to damage all the players if resolved unsuccessfully. Should the highlighted player not be able to resolve the chord in time, the other members of the ensemble may resolve it for them. While this may not do any damage to the Dissonance, it will mitigate some damage from the highlighted player. Players will be able to see their proposed notes as well as their role in the "SATB" format ahead of time. The players may change notes at any time before the tension chord reaches the tension point. When this happens, all entries are final and there is no going back. Backlash damage occurs when a tension chord is not resolved correctly according to the common rules of music theory.

Rhythmic Challenge

Rhythm Challenges are given to a single ensemble member or multiple members of the ensemble. They involve the player(s) performing the proposed rhythm while being given an audible tempo. The player(s) must complete the challenge in time, as the beats reach the tension point. These challenges may be proposed by the Dissonance as combat, or as means to discover puzzles, codes, and secrets.

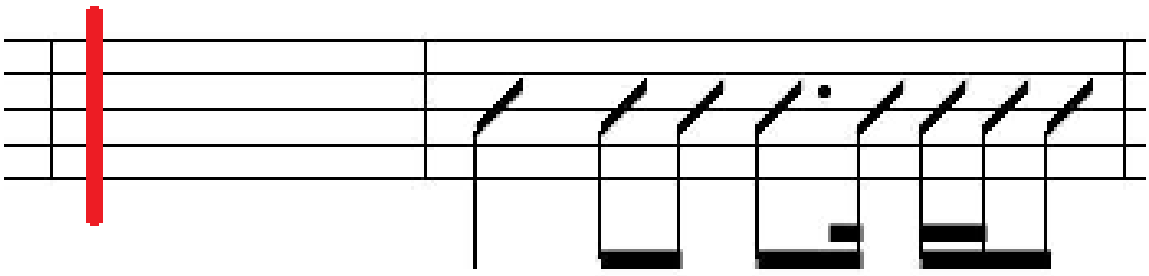

Figure 4.11. Rhythmic Challenge. This figure displays the tension point (red line) and the rhythmic challenge which must be performed in time.

Counterpoint Challenge

Counterpoint Challenges may exist in Duos, Trios, and Quartets and follow the rules of first, second, and third species counterpoint. Players will be challenged with a vertical series of intervals in SATB style that they will need to individually perform in order to complete the challenges. Players will need to work together and have a similar level of knowledge otherwise they may fail the challenge. Each player will be given a starting pitch and then one of these three instructions: parallel, contrary, or oblique motion in relation to the random, highlighted part (SATB) highlighted by a star. The highlighted player moves their note first and the rest of the ensemble must follow according to their assigned instruction. Players will need to use their music theory knowledge to work together to perform improvisational composition while abiding by the rules of first-, second-, third-, or fourth-species counterpoint.

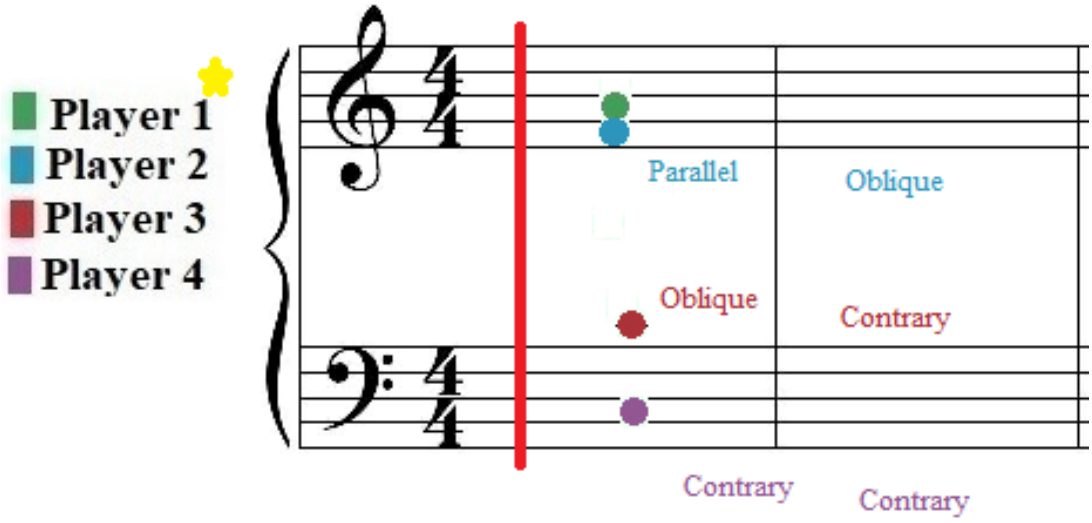

Figure 4.12. Counterpoint Challenge. Each player is represented by a color on the grand staff and must move in the prescribed motion in relation to the leader designated by the star. Alternatively, this challenge may include an AI to act as the leader.

Dictation Challenges

Aural Dictation Challenges require the player(s) to identify intervals, chords, or progressions and perform them before they reach the Tension Point. The proposed interval, chord, or progressions will be hidden with a question mark on the Sheet Music (see SRET challenge figure 4.16 in Puzzles, Codes, and Secrets subsection) until it is performed properly. One of the first challenges the player encounters are note identification and interval challenges because these are often first learned. These challenges will become progressively more difficult as the player presents higher levels of proficiency. One such advanced challenge may include reading the notes on the Sheet Music in the key of C but having to transpose and perform that note into the correct pitch for the player's instrument. For example, a tenor saxophonist plays a D when reading a C written for the piano.

Ensemble Chords on the Sheet Music will display "SATB" in the same row and that is also the order from top to bottom that the ensemble is displayed in. Beneath each letter is a clef and staff line with a note on it. Ensemble must perform the notes together at the same time either before the challenge reaches the tension point or once it reaches the tension point.

Free-Form (Bubble) Combat

Another exciting form of combat is free-form combat. This is defined as combat between the player and the dissonance outside of duels wherein there is no turn order of any kind. Instead, players would use Bubble Chords to defeat and damage the Dissonance. In like manner, the Dissonance would also use Bubble Chords to attack the player. The Bubble chord from the Dissonance will either hit the player or be resolved before hitting the player.

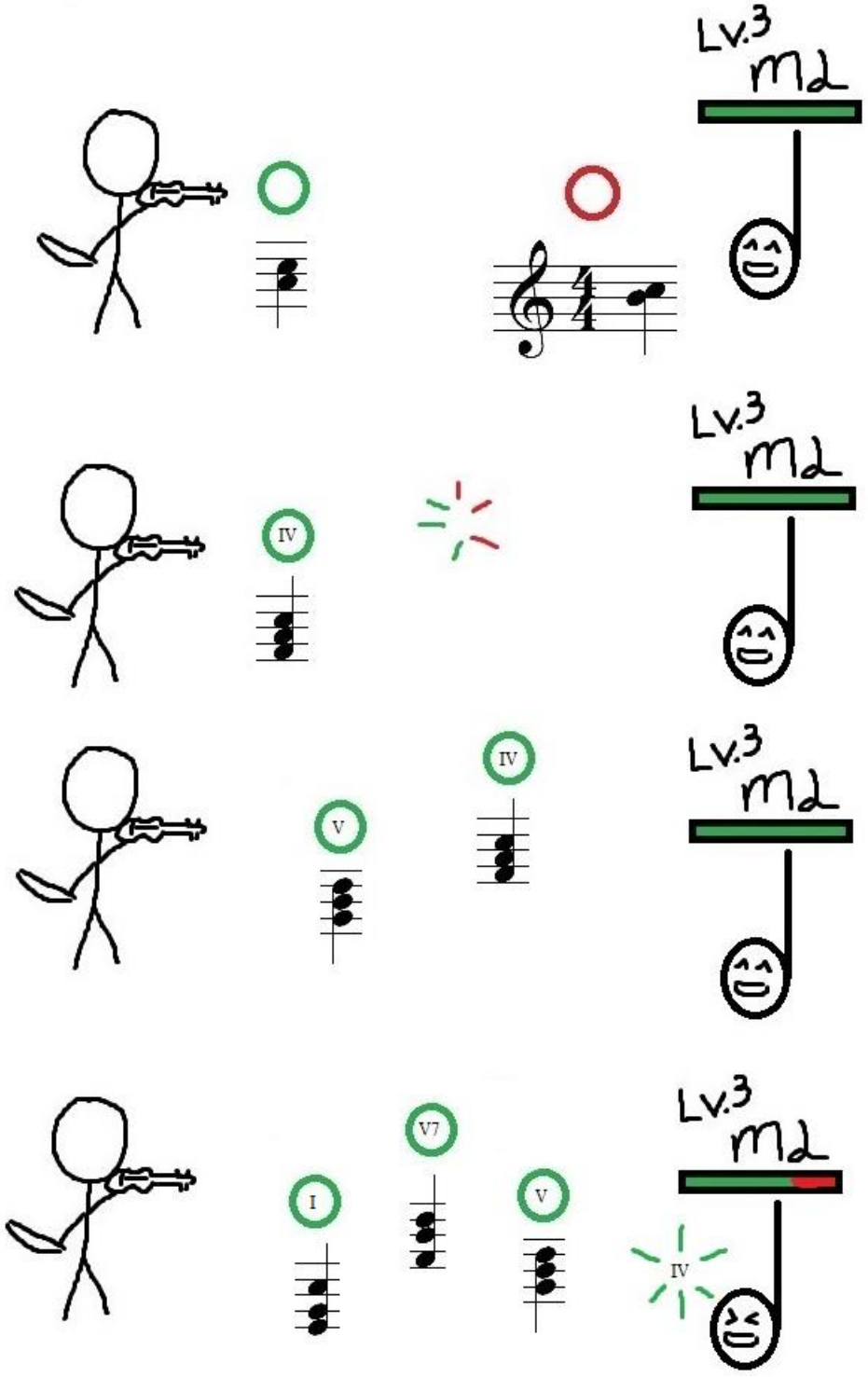

Figure 4.13. Bubble Combat. This figure represents a bubble combat where the dissonance attacks and the player responds in real-time by resolving the proposed dissonance and following up the resolution with a chord progression which damages the Baby Dissonance.

Boss Battles

Boss Battles take place in special locations known as “Dungeons.” Dungeons are a common RPG element that upon defeating enemies and the dungeon’s boss yield rewards (armor, experience, and loot). Boss Battles will aim to test player’s MT, SRET, and KBS knowledge on a similar level to a formative or summative assessment. Boss Battles involve a combination of both turn-based Music Theory Duels and free-form Bubble Combat.

All Boss Battles will require a unique amount of teamwork and communication. Some Boss Battles require a minimum of two players to combat the Boss in a Music Theory Duel on a Battle or Performance Stage. The remaining players are tasked with keeping the non-boss Dissonance (“minions” or “mobs”) enemies from reaching the Battle Stage. If the players combating the minions fail to keep them from reaching the stage, the Player’s on stage will lose Sanity Points. The minion dissonances may utilize different chords related to the Dissonance’s key signature and the level of knowledge/difficulty that the dungeon, boss, or players are on. This type of challenge may create an exciting environment of teamwork, learning, and fun.

In addition to Music Theory Duels, the Boss may also enact a PvP-styled bubble battle (see Figure 4.15). The boss can drag up multiple players onto the stage or one at a time depending on the boss’s sanity (hp) divided by the number of players present (four to eight). The boss may cause players to be switched out depending on if they are doing well or if an ensemble member voluntarily takes their place.

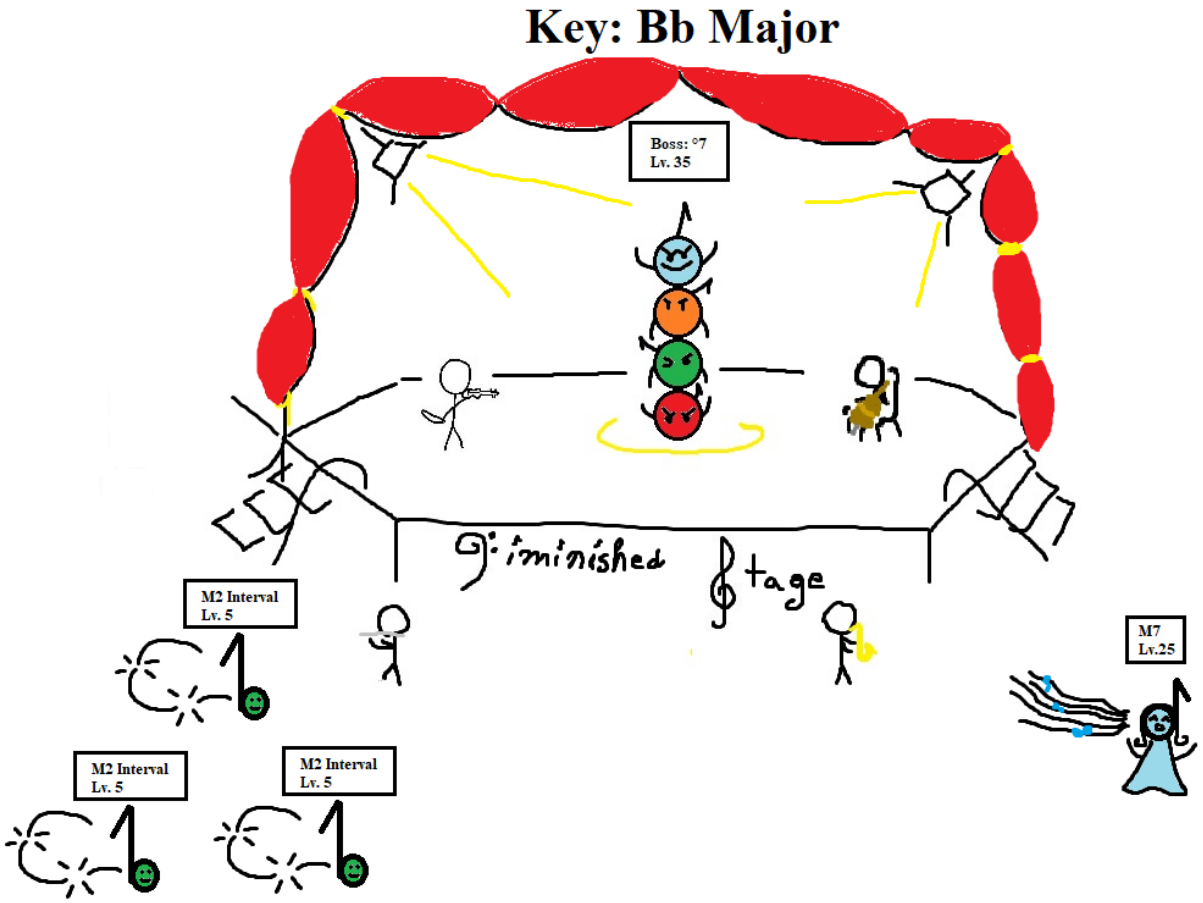

Figure 4.14. Boss Battles. This figure represents a boss stage and battle where two players (violin and cello) are fighting the boss directly in Music Theory Duels and another two players (flute and saxophone) are fighting against the minions in Bubble Battles.

When fighting a boss, chord progressions are heard in the background that maintain auditory appeal and center around the music theory concepts (intervals, chord progressions, etc.) that the player is learning at their current level. The background or "boss music" that plays during these battles will also serve as the compositional basis for which the music theory duel is based on. This means that as the music crescendos into a V chord, the player will be playing the melody or harmony along with the background music.

Adjusting to the Dissonance

Players can equip different “embouchures,” mouth pieces, reeds, breath techniques, and much more in order to adjust the quality of the sound that is needed to deal with each dissonance. Dissonance can creep in through being too loud, being out of tune, spelling a chord “incorrectly,” dragging or rushing the tempo, or by an incorrect resolution of a chord.

More Combat Mechanics

Puzzle Combat or Theory Combat involves the use of a MIDI keyboard or typing keyboard if a MIDI keyboard is not available. Enemies perform dissonant chords (or a chord) and the player(s) has a limited amount of time to resolve the chord. If playing with others, each player may have to spell part of the chord. The more theory a student has unlocked, the more “correct” choices the student can choose from. There are different kinds of combination, bonuses, and resolution effects for instruments that are in the same family, octave register, share harmonic overtones, etc. As in an ensemble, all or most instruments tune to the lowest instrument in their section or a specific instrument. The tuning feature may be based on how difficult beginners, intermediate, and experts of each respective instrument claim the note is to play in tune and or adjust while performing.

Some combats may require players to work together to spell chord progressions or intervals. Each player in the ensemble performs the next note to make up the continuing chord or interval. For example, if asked to demonstrate a major third interval, the player with the lowest Tessitura will go first and play a C. The next lowest Tessitura player will complete the interval by playing an E. If there are two or more Tessituras in the same register, the player with the lowest musicianship level will go first. While a tuba playing a C and a flute playing an E creates an interval larger than a third, in theory the notes C and E form a major third. The principle of

intervals larger than initially requested will come into play more seriously in other worlds than the starting world of C major. This is to help players understand on a theoretical level that the interval between a C and an E is a major third. However, a note will be made to inform the players about this distinction.

Musicianship and Tessitura Skill Trees

The UoMT will attempt to incorporate the use of real-life physics of sound (doppler effect, refraction, frequency, wavelength, nodes and antinodes, ear anatomy, etc.) and other sound related attributes (overtones, harmonics, resonance) and phenomena to maintain a focus on education. Skills, abilities, and attributes in the proposed game will be named and created in an attempt to demonstrate in even some small way these real-life effects. Such effects may include the relationships between sound and light (sonoluminescence[346, 347]), fire (sound and friction,[348]

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[346] Kyuichi Yasui, "Multibubble Sonoluminescence from a Theoretical Perspective," *Molecules (Basel, Switzerland)* 26, no. 15 (2021): 4624. https://doi.org/10.3390/molecules26154624.

[347] Alex Wilkins, "Bubbles Give Off Weird Light when Popped because of Quantum Physics," *New Scientist* (1971) 254, no. 3381 (2022): 12-12. doi:10.1016/S0262-4079(22)00595-4.

[348] Jon Butterworth, "Does Sound Generate Heat?" *BBC Science Focus* (2021). https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/magazines/does-sound-generate-heat/docview/2587172444/se-2.

thermoacoustics[349]), ice (Frost Quakes,[350] Cryoseisms[351]), healing (Music Therapy[352, 353]) among others. Implementing these sciences and phenomena will achieve a similar effect of what "magic" offers in other role-playing games, but in an attempt to exploit game mechanics as learning opportunities and teach scientific and natural sound and music phenomena utilizing scientific explanations or exaggerations thereof that may in some way provide even a little bit of learning and application for the players about the relationship between music, sound, nature, science, and psychology.

Every note or musical action a player performs contributes to their musicianship level. As one progresses through their musical journey, they will level up and have the option to choose from a skill tree of which kinds of music-theory-based knowledge and/or Tessitura upgrades they wish to unlock next.

Currently, there will be two kinds of skill trees in the UoMT, a Musicianship skill tree and a Tessitura skill tree. The Musicianship skill tree will include boosts to the player's stats (health, damage, movement speed, chord resolution effects) and the Tessitura skill tree will

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[349] Armando Di Meglio and Nicola Massarotti, "CFD Modeling of Thermoacoustic Energy Conversion: A Review," *Energies* 15, no. 10 (2022): 3806, https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/cfd-modeling-thermoacoustic-energy-conversion/docview/2670153144/se-2.

[350] Jerald Pinson, "Predicting the Next Big Frost Quake," *Eos*. 101 (2020). https://eos.org/research-spotlights/predicting-the-next-big-frost-quake.

[351] Rachel Berkowitz, "Icy Resonance," *Scientific American* 327, no. 3 (September 2022): 21. https://search.ebscohost.com/login.aspx?direct=true&db=bah&AN=158398036&site=ehost-live&scope=site.

[352] Carla Gramaglia, Eleonora Gambaro, Camilla Vecchi, Davide Licandro, Giulia Raina, Carla Pisani, Vincenzo Burgio, et al. "Outcomes of Music Therapy Interventions in Cancer patients—A Review of the Literature," *Critical Reviews in Oncology/Hematology* 138, (2019): 241. https://doi.org/10.1016/j.critrevonc.2019.04.004.

[353] Oliver Sacks, "The Power of Music," *Brain* 129, 10 (2006): 2529. https://doi.org/10.1093/brain/awl234.

include further resolution effects, ensemble bonuses, abilities related to playing with the same or different instrumentation family and different kinds of sound phenomena and attributes.

Tessitura Skill Tree

Tessitura upgrades can consist of boosts to solo performance, or boosts to specific styled duets, trios, quartets, etc. For example, a violin Tessitura can unlock performance abilities that work in combination with other string instruments of their family (viola, cello, etc.) or with accompaniment instruments (e.g., piano) or instruments outside their family. Specializing in these performance styles and techniques facilitate combat-based bonuses and resolution effects when resolving chords that correlate to the specializations chosen.

The Tessitura skill tree may also include specializing into the material the character's instrument is made from. Granting certain bonuses if the character's Tessitura is made of specific material or from a specific era or craftsman. These mechanics provide another opportunity to teach some aspects of music history. Resolution effects may apply Notation Markings to the Dissonance such as staccato, legato, fermata, and arpeggiation markings. Vibrato may also be a form of specialization which can be a performance technique learned through or coinciding with some of the teachings of the physics of sound and music. These notation markings will affect how the next chord proposed by that Dissonance sounds or provide bonuses for the next attack (chord resolution) against the Dissonance.

Tessitura Skill Tree				
Solo	Ensemble	Symbols	Era	Tempo
Passing Tones	Double	Fermata	Prehistoric	Adagio
Neighbor Tones	Bass Note	Trill	Ancient	Andante
Anticipation Tones	Family	Turn	Medieval	Alegro
	Woodwind	Glissando	Renaissance	Presto
	Brass	Slur	Baroque	
Duet	String	Crescendo	Romantic	
		Decresc.	Contemporary	

Table 4.2. The Tessitura Skill Tree. A draft of the possibilities within the Tessitura Skill Tree.

Musicianship Skill Tree

Concepts that have to do with one's general knowledge of music theory will be put into the Musicianship Skill Tree. Concepts that deal more specifically with one's Tessitura (instrument) will be put into the Tessitura Skill Tree. There will be concepts that overlap and are present in both skill trees. For these skills, there will be a level of synergy should the player select the same music theory concept from both skill trees. For example, when learning about notation markings, this will be in both the Musicianship and Tessitura skill trees (ST). This is because a staccato marking is a concept explored when learning about music theory or at least in an introduction course and when learning to play an instrument. A voice or woodwind Tessitura for example will have a "Diaphragmatic Breathing Skill." This is a real-life concept and technique for singing. In combat, this will be represented as the player taking a turn to prepare for the next 4-8 notes dealing more damage. In bubble battles, this would be represented as the player's character performing the action of demonstrating diaphragmatic breathing. During this

time, the player wouldn't be able to move without interrupting the action. After the action is complete, Bubble chords they resolve may grant them more points. For in practice, diaphragmatic breathing affects one's ability to sing.

Musicianship Skill Tree								
Music Theory					**SRET**			
Major	Minor	Diminished	Augmented	Notation	Ear Training	Dynamics	Solfège	Audiation
Interval	Interval	Interval	Interval	RN	Pitch	*p*	Moveable "*Do*"	Listening
Scale	Scale			FB	Intervals	*mp*	Do Re Mi	Improvising
Triad	Triad	Triad	Triad	NN	Melody	*mf*	Fixed "*Do*"	Composing
Seventh Chord	Seventh Chord	Seventh Chord	Seventh Chord	Neume	Rhythm	*f*	Inflections	Notating

Table 4.3. The Musicianship Skill Tree Part One. This example of the Musicianship Skill Tree showcases some examples of Music Theory and SRET concepts/specializations.

Musicianship Skill Tree						
Music & Sound Phenomena						
Healing	Fire	Ice	Earth	Lightning	Air	Light
Music Therapy	Thermoacoustics	Frost Quakes	Singing Dunes	Lightning	Longitudinal Waves	Sonoluminescense
Melody	Friction	Cyroseisms		Volcanic Lightning	Sonic Boom	Ultrasound
Harmony					Wind Vacuum	
Dynamics					Sky Quakes	

Table 4.4. The Musicianship Skill Tree Part Two. This example of the Musicianship Skill Tree showcases some examples of Music and Sound Phenomena concepts/specializations and how they relate to the elements of nature.

There may also be further subdivisions within the Musicianship and Tessitura Skill Trees that delve deeper into certain performance styles, eras of music theory, and notation styles (RN vs NN vs FB). Other sound phenomena may include concepts such as amusia, music acoustics, The Mozart Effect, the relationship between music and math, spatial temporal ability, verbal skills, speech prosody, emotional sensitivity, and general cognitive abilities."[354, 355, 356]

There is a concept of "Making Time Stand Still" in performance. This concept will be inserted in the game as a Resolution Effect that players can obtain in their Tessitura or Musicianship ST. This effect will work slightly differently in each combat context. In the context of Turn-Based Ensemble Battles against the Dissonance, this will slow down the Tension Chords. In the context of Free-From combat, this will slow down the Bubble Chords of the Dissonances. These skill trees will give access to stun or daze effects, damage over time (DoT), heal over time (HoT), effects to weaken or strengthen the players and the Dissonance.

Resonance Meter and Resolution Effects

The more chord resolutions or progressions occur in combat, the more one's resonance meter is filled. Once the meter reaches its tension point, the player fully resonates with their Tessitura and may perform a continuous chord progression for as long as the duration of the depleting meter allows. This ability can be specialized wherein each chord played in proper succession according to the player's learned knowledge in-game, results in attacking all

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[354] Sacks, "The Power of Music," 2529.

[355] Edward W. Large, *Music Perception: An Interdisciplinary Journal* 27, no. 2 (2009): 145. https://doi.org/10.1525/mp.2009.27.2.145.

[356] Clifford K. Madsen, "Nonverbal Measurement of Responsiveness to Music," in *Advances in Social-Psychology and Music Education Research*, ed. Patrica Maurice Ward-Steinman (Taylor & Francis Group, 2011): 53. doi:10.4324/9781315565743.

dissonances, focusing on one dissonance, or compromising damage towards dissonance to heal and boost the ensemble. The time and damage amount are based on the player's musicianship level, Tessitura level, and unlocked skills. Furthermore, the next "x-amount" of chord progressions from the dissonances after this ability has been used are slowed.

Continuing and resolving chord progressions by one member of the ensemble facilitates filling the resonance meter of all ensemble members by a small amount. The player resolving the chord receives more resonance than the rest of the ensemble. Dissonances, or at least boss enemies and mini bosses, will maintain a "Dissonance Meter" that will work similarly to the player's Resonance Meter. When activated, all ensemble members will be challenged with a series of fast-paced chord progressions. For the duration of the depleting Dissonance Meter, ensemble members have the opportunity, as much as their real-life keyboard skills allow them, to deflect and repel the attack (chord progressions). If a player is hit, they will be weakened, resulting in them taking more damage from future hits and their next chord progressions dealing less damage for a set duration.

In traditional RPGs there are several roles that players may take which allow them to work together as a team. These roles include, "DPS," "Tank," and "Healer." In a similar way, when specializing in one's (Tessitura or musicianship) skill trees, they may choose "Resolution Effects." The resolution effects happen once the player resolves a tension chord. One such effect may be, "When you resolve a tension chord, deal 2 (* x) damage to every dissonance. X is equal to your musicianship level." Other resolution effects may include increasing the damage of your ensemble, reducing the amount of damage received, healing you or your ensemble, slowing down the time it takes chords to reach the tension point, to make oneself the target of the next chord challenge or to take the damage if an ensemble member fails to resolve or spell a chord.

Some resolution effects can be chosen during the player's turn or during another ensemble member's turn (see the PvP List of Power-Ups and Musicianship and Tessitura Skill Trees).

Player versus Player Combat

A popular aspect of many MMO games is player versus player combat (PvP). This is because as humans, we enjoy having fun and being competitive.[357] There will be two forms of PvP Music Theory Duels (MTD) and Bubble Battles. In a MTD, one player is the challenger and the other player is the defender. The rules are similar to fighting the dissonances. The Challenger goes first. Performing as many tension chords as they can in 10-30 seconds. The Defender responds by resolving these chords. Resolving the tension chords successfully results in "Match Points." Match Points are temporary points assigned to the player based on the player's score during the PvP match and are converted (or transposed) to Musicianship Experience and Tessitura Experience after the Match Ends.

Bubble Battles use free-form combat and Bubble Chords as described in "Combat and The Dissonances." In Bubble Battles, the entire ensemble may participate. There are two sides, one for each team. Players perform tension chords (or 1 measure rhythms if percussion Tessitura) which are sent over in bubbles towards the other team. The members of the opposing team must move to where the bubbles are coming towards and use their MIDI keyboard or Virtual Keyboard to resolve the tension chords. Sending and popping (resolving) bubble chords accumulates points which will determine the winning team.

To mitigate potential confusion from the amount of bubble chords on the screen, each team's bubble chords will be highlighted different colors (red and blue including settings for

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[357] Ward-Steinman, *Social-Psychology and Music Education*, 12.

color-blind features). This can be further mitigated by using a “Lane Feature” in the Bubble Challenges. The Lane Feature utilizes eight lanes, two for each player to control. One lane is for sending bubbles and the second lane is for popping incoming bubbles (see Figure 4.15). The players may move freely between lanes. However, players may only propose and answer bubble challenges while standing in front of the appropriate (sending/receiving) lanes.

If a chord is not a Pure Tension chord (such as a V^7 or $V^{4/2}$), then the player simply responds to the bubble chord with another chord that makes theoretical sense based on the concepts learned in the game and according to each musician’s in-game musicianship level. Some players may have gone further than others and may understand more theory (i.e., how to perform and resolve secondary dominants or extension chords). If the proposed chord does not make theoretical sense, then the bubble will pop. Bubbles will also pop if they are not responded to in time. If a bubble chord pops without being resolved, then the team on the receiving end of that bubble loses points. When resolving Bubble Chords, players can step into the desired lane and either wait for the bubble chord to approach them and be within close range or send out the correct bubble chord to meet the proposed. Bubble chords may bounce back if special conditions are met.

The key and notation (RN, NN, FB) within the bubble may change at frequent or set periods throughout the match depending on the match settings. For example, the notation of a Bubble Chord may appear as, “CM” indicating a C major chord. The notation in the Bubble may suddenly change to a I, indicating the same chord, just read differently. The notation may also change into a I which would indicate a I chord, first inversion. The key will be displayed in the center of the screen in large font. Numbers will appear in front of the key counting backwards

from three to one. Then the key will change, and this key change will affect the required response/answer to all existing Bubble Chords.

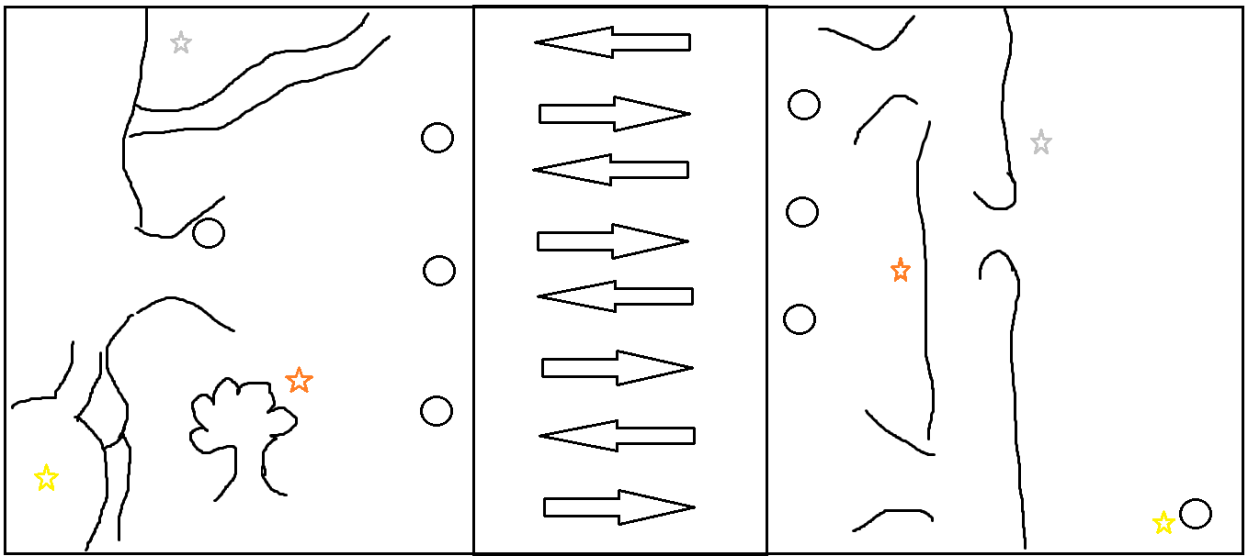


Figure 4.3. Player versus Player Combat. The circles represent players. The arrows represent the 8 lanes. 4 lanes carry bubble chords to each team. The different colored stars represent the spawn points for the different rarity of power-ups. The small terrain design is meant to symbolize and represent slopes, hills, mountains, a tree, and a river. With access to official software, other than Microsoft Paint, and an art team, more professional designs can be drawn up.

On the battleground, where the PvP Bubble Challenges take place, each side will have access to random power-ups. These power-ups can have devastating effects on the results of the match. Power-Ups will be divided into different tiers such as “Bronze,” “Silver,” and “Gold.” This determines their rarity and effectiveness. Rare power-ups are only granted by successfully resolving tension chords in great succession. Once a player encounters a power-up, they can choose to leave it alone, equip it if they have a free slot, or swap it out for an already equipped power-up. Players may only hold up to 3 power-ups at any given time. Power-ups, unless otherwise specified, only affect the lane that the player is standing in. Rare power-ups will also

spawn further away. Making it potentially risky to leave your lanes unattended to retrieve what may be a match-altering power-up. Examples of powerups include the following:

- Freeze, (Enemy Bubbles, the Field)
- Clear All, (Enemy Bubbles, One Lane, the Field)
- Speed Up, (Allied Bubbles, the Field)
- Slow Down, (Enemy Bubbles, the Field)
- Shield (Allied Bubbles)
- Remove Shield (Enemy Bubbles)
    - Shielded Bubbles require the player to play the V/V or vii/V of the chord, the chord inside the bubble, and then its resolution.
    - Shielded Bubbles have timers. They stay and hold up the queue of bubbles behind them until they are resolved. The bubble will last, for example, 5-10 seconds before popping.
- Bounce Back (Half/All) Bubbles in One Lane.
- Change the Inversions of All Bubbles in one or all lanes.
- Change the notation of All Bubbles in one or all lanes.

To clarify, in Bubble Battles, one team gets points for resolving, or properly responding, to the proposed bubble chord, or if their proposed bubble chords go uncontested/unresolved. There will be three rounds of Bubble Theory before the PvP match ends. Once the match ends, a results and score panel will appear which shows players their statistics during the game. This panel displays information such as, the total amount of bubble chords resolved, accuracy of resolving chords, point contribution to your ensemble's total point value, the amount and quality of power-ups picked up and played, and who the MVP of your ensemble is.

There will be several maps on which the Bubble Challenges take place. This is to provide variety for players. In addition, each map has its own power-up spawn points and layout. This means that the Lanes will not always be so cut and dry. In some maps, the lanes may curve and

loop around the map. Furthermore, there will be a few secrets hidden on each map that may serve as rare power-up spawn points.

Bubble Theory can also be played at a lower level or introductory level of music theory by having each team spell intervals on their keyboards. In order to resolve or pop each Bubble Interval, the student in the receiving lane need only to spell the same interval. This challenge can be done either all within a specific key or within any key. The key can be determined as mentioned elsewhere, a factor of the game that is set until changed on a timer or randomly, or by power-ups.

Puzzles, Codes, and Secrets

As part of helping NPCs, some may speak in either RN, NN, or FB. Only by spelling the chords will you be able to decipher what they are saying.

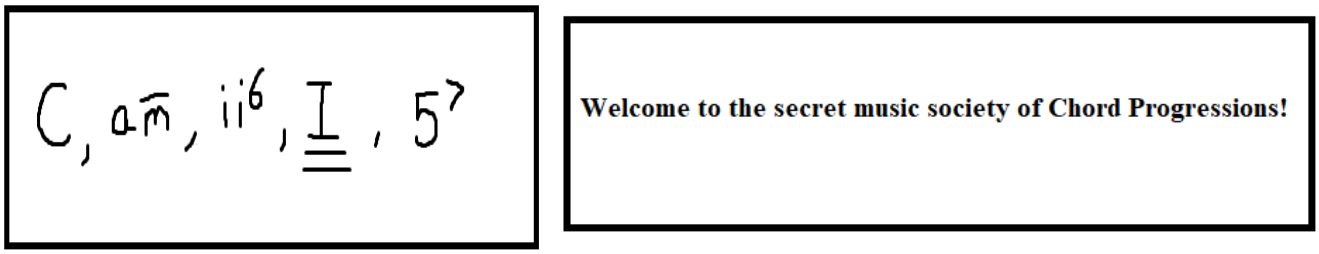
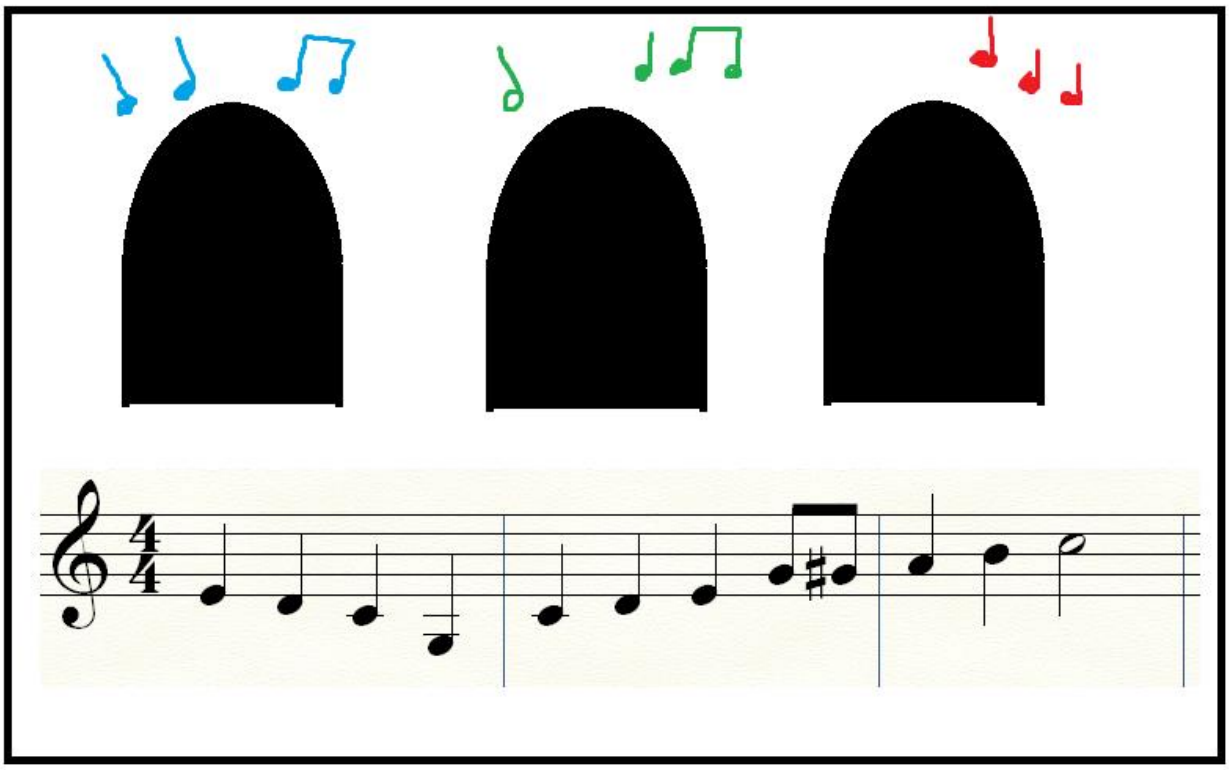


Figure 4.15. Decoding Messages. The example on the left is what a text box may look like from an NPC prior to playing the chord progression or "translating" the message. The example on the right is the decoded message that will be displayed piece by piece as the chord progressions are performed.

Not all puzzles or challenges manifest in the form of “combat.” Some manifest in the spelling or performance of a scale.

Figure 4.16. SRET Challenge. This is an example of practicing SRET skills in the form of a puzzle where the player listens to a melody and then must select the correct door or path to go down that plays back the same melody or chord progression that they just heard. Further elaborations can be added such as phrasing, dynamics, a bass line, or a score.



To unlock doors or decode secrets, sometimes the scale of the world must be performed in ascending, descending, or random order.

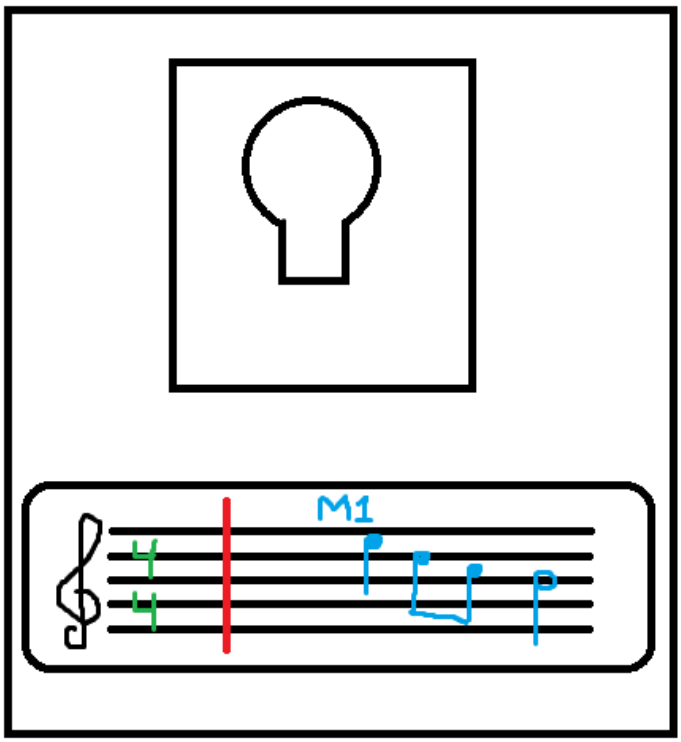


Figure 4.17. Melody Lock Picking. To unlock a door, players may be required to play a melody.

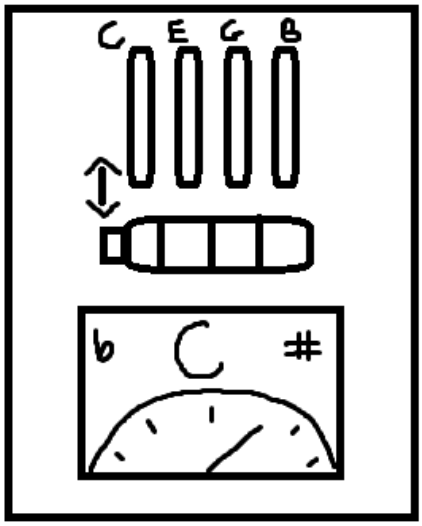


Figure 4.18. Tuning Lock Picking. To unlock a door, players may need to sing (or play an instrument) in tune utilizing a computer microphone to detect and determine pitch.

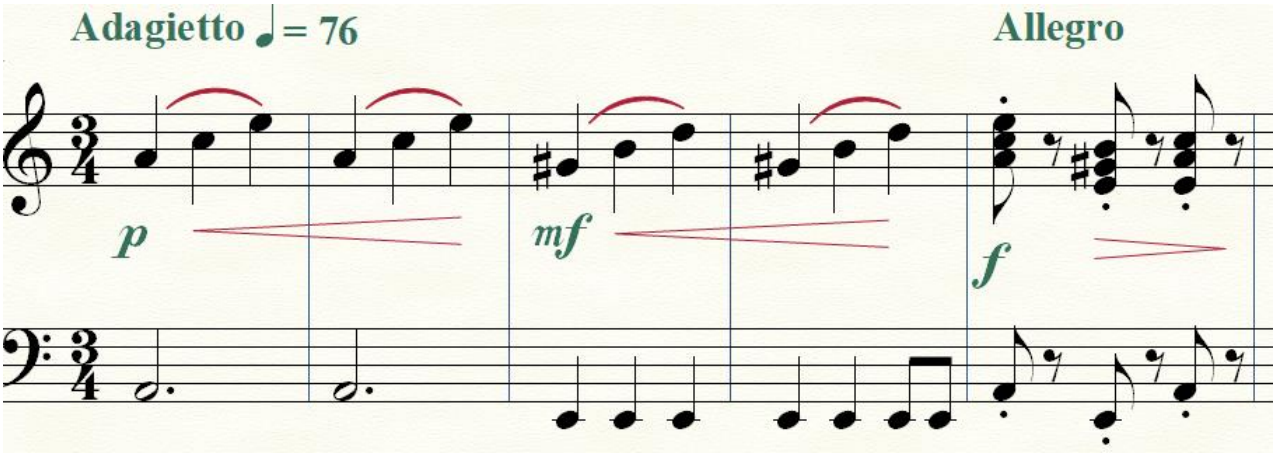
Musical Minigames

Mini games are concepts implemented to keep players engaged and offer some kind of in-game rewards or value. Mini games may also provide cross-genre interest or value to the game. This section will explore five minigames related to the field of music. The rewards offered for successful completion or for merely playing the game can be exp, achievements, or clues to solve puzzles, codes, and unlock secrets.

Tiptoe Minigame

The first minigame is a “tip-toe” minigame where the player has to tip-toe down a hallway and they do this, not with the standard WASD for arrow key controls but, through performing the specified arpeggios that appear on the Sheet Music score on the top-middle of the screen on the MIDI or keyboard piano. To hide from Dissonance or other enemies the player will play a block chord of the arpeggio.

Figure 4.19. Tiptoe Minigame. The slow arpeggiating section represents the notes needed to sneak around. The quick succession of staccato eighth notes represent the notes needed to hide. Further examples can include Chord Progressions, Scales, and other technical exercises or melodic patterns.



Copyright Court Case

The second minigame relates to music, money, and the law. In this minigame, the player can serve as the lawyer or as a jury member on copyright cases and learn about real-life court cases and concepts related to music, money, and the law. The player, if playing as the lawyer, will need to establish the purpose and character of the use; the nature of the copyrighted work; the amount and substantiality of the portion taken; and the effect of the use upon the potential market among other factors.[358]

Music Theory Note Heads

The third minigame is called, "Music Theory Note Heads." In this mini game the player or ensemble control the note heads on a staff and have to align themselves in the appropriate order to match the assigned chord before the chord reaches the tension point. The chord can be notated in FB, RN, or NN.

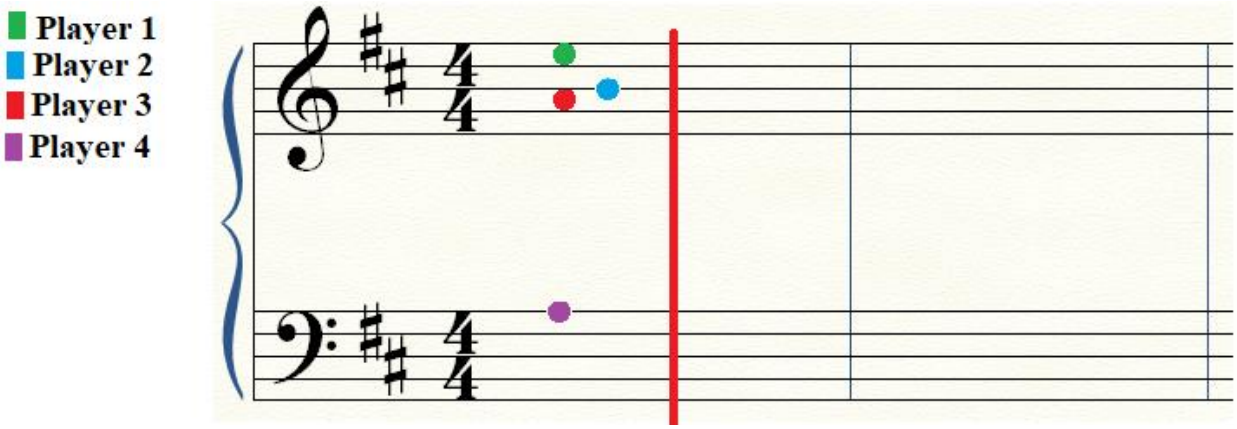


Figure 4.20. Music Theory Note Heads. Players will move to fixed positions (lines and spaces of the staff and beats 1-4) on the score that appears in-game. The tension point is represented by the red line. Players will be allowed to customize their note head colors.

[358] Rich Stim, "Measuring Fair Use: The Four Factors," *Stanford Libraries* (Last Accessed on July 4, 2023). https://fairuse.stanford.edu/overview/fair-use/four-factors/.

Reverse Economics and Music Administration

The fourth minigame is one that teaches players about FTE and the principle of reverse economics. According to Benham, "money is not saved by cutting music programs, but by making them stronger. The long-term effects of the elimination of a [music] program are most costly than the initial savings anticipated."[359] Larger ensembles are economically more secure because "the most cost-effective personnel are those who provide instruction to the largest number of students in a given class period or who carry the largest student loads."[360] The player will be tasked with a series of multiple questions and drag and drop tasks in order to manage financial budgets and survey the music colleges around the kingdom and advocate for more music classes. This minigame may also consist of assigning teachers to schools through a similar drag and drop method wherein every teacher will require a 1.0 position and every school will have a set amount of music credits allotted to them which must be filled.

Instrument Repair

An instrument repair minigame will consist of representing accurate instrument maintenance mechanics, tools, and actions. Players will gain a visual and digital representation of how to repair their Tessitura. This may serve to facilitate interest and real-life knowledge of how one may properly take care of their instrument.

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[359] Benham, *Music Advocacy*, 151.

[360] Ibid., 152.

Conducting

While technology that can track one's hands, baton, and their conducting styles and phrasing, exists in the form of a VR headset and the game *Maestro VR*, there are no plans on implementing any kind of virtual reality devices within the UoMT.[361] Within the UoMT, players can move their mouse in metrical conducting patterns and to designate the dynamics, they can make their mouse strokes wider or shorter. Additionally, the left-mouse button can be used to symbolize the utilization of cues. During conducting challenges and practices, the mouse cursor will change into that of a conducting baton. While perhaps not ideal, these conducting exercises may still help introduce the player to conducting patterns and techniques. Future research will investigate the possibility of using two mice for this, or implementing software and hardware sensors that plug into a USB port on the computer and track hand and baton movements (utilizing special gloves) and distance from the sensors.

The Practice Symposium

The Practice Symposium is a location that can be accessed from anywhere in the game from the player's Music Theory Toolbox. When selecting a badge, the player has the option to travel to the Practice Symposium and improve their proficiency with that subject matter. The Practice Symposium focuses on drilling and practicing music core concepts such as interval and chord identification, spelling, and performance. The player is given the option of the type of combat they wish to partake in that will focus solely on the subject-matter. Further, players may

[361] Symphonic Games, "Maestro VR," (last accessed on July 4, 2023). https://store.steampowered.com/app/1327920/Maestro_VR/.

enter the Practice Symposium with their ensemble and practice together or compete for the best efficacy results (speed plus accuracy).

Daily Quests, Login, and Playtime Rewards

Another common feature in computer games is “Daily Login Rewards.” These are rewards that the player collects each day that they login to the game. Furthermore, for each consecutive day, the reward increases. Commonly, at the end of the month the best reward is given and the login calendar or counter resets. In some cases, the player can only receive the best reward at the end of the month by logging on and collecting all the previous days’ rewards. This is an addictive feature that causes players to return to the game every day. This feature may lead to addiction, which is heavily warned against. To mitigate this effect, daily login rewards, if implemented, may remain limited and the strict ruling on needing to login every day may not be enforced. For example, each time a player logs in it will be counted as “one out of X-amount of days” and at the “Xth” login, the player will receive the reward in comparison to counting logins according to calendar days.

Playtime rewards are similar to daily login rewards in that the player receives rewards after being logged in for a set amount of time (i.e., one hour). This is another addictive feature that may lead to a serious addiction. To mitigate the threat of addiction, the playtime rewards, if any, may be limited to 5 minutes of music theory challenges (possibly occurring within the Practice Symposium), where the only playtime that counts towards receiving the reward is that wherein the player is learning about music theory and applying that knowledge.

Daily quests are another method used in popular MMORPGs (i.e. WoW) that may lead to addiction. However, these missions are always optional and may be limited to completing a certain task as opposed to staying logged in for a set amount of time or consecutively logging in

for a desired in-game benefit. Therefore, these missions within the context of the proposed game may simply be the applied gamification of music theory homework questions- that is resolving dissonances.

Keeping True to the Bible

In many games and specifically RPGs there are manifestations, teachings (while fictional still imprint themselves on the player's mind), and contradictions to the Word of God. Dempsey comments on the Biblical teaching that by beholding one becomes changed (2 Corinthians 3:18).[362] Dempsey was referring to how when one is in a relationship with someone else, the more time that the two persons spend together, the more they become changed and begin to behave like one another. This principle applies to whatever occupies the majority of one's time. Whether that is soap operas, drama shows, explicit language, appropriate and inappropriate content, and even games. According to Hughes et al. research shows that game-based interactions make an impact on players and "elicit real-world psychological responses."[363] Research on mirror neurons reveals the "science" behind the biblical passage of 2 Corinthians 3:18. Researchers found that: "Mirror neurons are activated both when actions are executed, and the actions are observed. This unique function of mirror neurons may explain how people

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[362] Rod Dempsey and Dave Earley, *Spiritual Formation Is…* B&H Publishing Group 2018, Kindle Edition, 9.

[363] Chelsea M. Hughes, Brandon J. Griffin, and Everett L. Worthington. "A Measure of Social Behavior in Team-Based, Multiplayer Online Games: The Sociality in Multiplayer Online Games (SMOG) Scale," *Computers in Human Behavior* 69, (2017): 386. https://doi.org/10.1016/j.chb.2016.12.043.

recognize and understand the states of others; **mirroring observed action in the brain as if they conducted the observed action** [Emphasis added]."[364]

Therefore, according to the Bible, if one spends more of their spare time (the time they are not working or tending to other necessary responsibilities) doing these things, their behaviors, attitudes, word choice, actions, and perhaps even beliefs will change to reflect the treasure they have set their hearts upon. It is the prerogative of this game concept to avoid as many anti-biblical tropes and traditions (e.g., profanity, nudity, alcohol, drugs, magic) while still maintaining an RPG setting to facilitate optimal learning opportunities, avoid negative behavior transmittance through mirror neurons, and the potential to reach younger audiences (middle or high school).

Death

In the popular MMORPG, "World of Warcraft," Gibson makes his observation of the game's concept of death. Death is made trivial, promotes spiritualism, and "a faceless, nameless spirit controls the act of resurrection."[365] In order to take a less spiritually deprived approach, when players lose all of their HP or "Hit Points," they simply faint and pass out. If performing in an ensemble, should the other players of their ensemble prove victorious over the dissonance in combat, any player(s) that have fainted will simply awaken to the wondrous sound of their teammate's music. Furthermore, while the concept of "HP" will be in the game, the name may change to something more music-related, such as "Sanity." This mechanic may be explained in

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[364] Sourya Acharya, Samarth Shukla, "Mirror Neurons: Enigma of the Metaphysical Modular Brain," *Journal of Natural Science and Biology, and Medicine* 2, (July 3, 2012):118-24. doi: 10.4103/0976-9668.101878. PMID: 23225972; PMCID: PMC3510904.

[365] Gibson, "Designed for Play," 31-32.

the following sentence: There is only so much dissonance a musician take before the dissonance overtakes them. This is meant to replace the concept of literally dying or getting physically hurt with becoming overburdened by the complex task of performing music-theory-based challenges.

The Church

In many RPG games there exists a church organization or some kind of belief system. Due to the conflicting nature of this and the author's personal beliefs about God and the Bible, this aspect of the game may not be included, or if it is, the church may simply reflect the reading of God's word along with worship or hymn music playing. Each church in a different world or era may represent the different styles of Church Music as to maintain biblical neutrality and historical accuracy.

In-Game Holidays

Contrary to popular understanding, the origins of many of the Earth's man-made traditions and holidays, when examined with a Biblical worldview are questionable, to say the least. However, in many games there are festivities that occur in-game that align with the real-world calendar and with real-world events. The most common events are Christmas, Halloween, and Easter. While examining the historical origins of each of these manmade traditions and holidays may be considered outside the scope of this dissertation, their existence poses the question of whether they will be represented in the author's game. The answer to the inclusion of these holidays or even God's holy days will require more study and prayerful consideration.

Cyberbullying and Privacy Concerns

The UoMT will be an edutainment platform that may mimic some aspects of social media. This game will also help facilitate unique learning experiences not available in an average music theory classroom.

Albert discusses the benefits and dangers of integrating social media in music education classes. While social media may help to "facilitate learning experiences that would be less likely to happen in a brick and-mortar setting," privacy and cyberbullying issues "continue to make educators wary of using social media in formal educational settings."[366] To negate the phenomenon of cyber bullying and keep it from happening in the *Universe of Music Theory*, three anti-bully measures will be proposed.

One, there will be an automatic language filter that blocks all expletives and profanities and will be adapted to include profanities that are attempted to break through the filter by spelling words through the use of uppercase letters inside of other words. This language filter will also block expletives and profanities in foreign languages.

Two, players will have the option to block other players. This is a common feature in many MMO games. For example, player A who blocked player B will no longer be able to see any of player B's chat messages in any context within the scope of the game.

Three, there will be an in-game feature that allows players to report other players for reasons such as being rude, mean, dishonest, bullying others, and other negative behaviors. When a report is made, UoMT personnel will be able to see the chat logs of the player in question and determine if the report was accurate or false. This will allow the game staff to punish the bullies and give peace of mind to the victims.

The notion of chat logs prompts the question of privacy within the game's chat messaging system. All conversations will be logged. A disclaimer will be integrated to the game's terms and conditions to inform the player that chat logs will only be viewed if a report is

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[366] Albert, "Social Media in Music Education," 31.

made by the player or concerning the player. The chat logs will serve to aid the game staff in making fair judgements and informed decisions regarding cyber-bullying punishments. Another disclaimer will be made that informs all players that the purpose of the chat system in this game is for discussing in-game content. While friendly discussions about real life are allowed, one should remember the kinds of conversations that are and are not appropriate to be discussed on this medium and behave accordingly.

UoMT Summary

In the Universe of Music Theory, players will need to solve challenges, overcome the Dissonance, and master the rules of music theory to become a Music Master. Players may find themselves utilizing music to learn about musical instruments; discover different musical styles, harmonies, and chord progressions; uncover the meaning of music from various philosophies; save music programs; resolve the Dissonance; participate in a plethora of other fun, engaging, and challenging musical activities; and become a Music Master. There are many different paths to becoming a Music Master. Each path of praxial application leads players to unlock new music core tools and skills.

The UoMT presents music core material in a fun, engaging, and culturally relevant way to twenty-first-century students and combines other interdisciplinary music-based fields of study. The UoMT aims to create a memorable and fun experience that will engage students in course material and inspire within them a desire for lifelong music involvement of practical musicianship. It is important to keep in mind that the progression in which concepts are learned in the game will be presented in a similar order as most music theory core curricula. The UoMT facilitates many unique play styles to match different performance, aesthetic, and mechanical preferences. The Universe of Music Theory may be utilized as a supplementary learning tool in

conjunction with traditional in-person or online learning. Practically, the UoMT may maintain the function of computer lab activity within the music core curriculum. The UoMT is also designed to be played outside of the classroom over school breaks to facilitate year-round learning and reinforcement.

By transforming the remedial classroom activity of "resolving music theory chords" into a fun, extravagant, engaging, and dramatized activity represented in a digital and immersive world, students may find joy, fun, and intrinsic motivation for practicing these core concepts in real life. Chapter Four captured many different and interconnecting concepts that facilitate presenting music theory core and related concepts into a fun and engaging digital game-based learning experience. As Kesler states, "the music programs that are successful are the ones that continue activities after the school day is over."[367] The UoMT has great potential to achieve this goal for the music core classes and many interdisciplinary music-based subjects.

[367] Kesler, "Today's Suzuki Method," 20.

CHAPTER FIVE: SUMMARY AND DISCUSSION

Summary of Research

Modern education is facing an Educational Engagement Crisis. Many modern twenty-first-century students, having grown up around the internet, technology, and games (efficient methods at capturing one's time and attention) have become bored with traditional teaching methods. When students enter the classroom, a place devoid of "fun" as they know it, the classroom is immediately transformed into a battleground for their attention between the educator and the devices (physical and metaphorical) of the student. Music theory classrooms are no exception to this phenomenon. Students who are not engaged in course material may maintain lower levels of learning, efficacy, and achievement. Further, if educators cannot hold the attention of their students, then educators are at risk of losing those courses and college enrollment. Therefore, the twenty-first-century music theory student may require a new fun, engaging, digital, and game-based method to maintain their attention in-class.

Digital Game-Based Learning (DGBL) and Gamification maintain great potential in resolving the Educational Engagement Crisis, as they can offer fun, engaging, multi-modal, and relevant methods to learning and reviewing course material. DGBL and gamification utilize intrinsic and extrinsic motivation to facilitate this potential. Thus, a digital learning game rooted in music core concepts (MT, SRET, and KBS) maintains great potential to captivate the attention of students and keep them engaged in course material all year round. This dissertation proposes such a game, the Universe of Music Theory: Music Masters (UoMT). The UoMT allows the student to practice music core concepts in an engaging, fun, culturally relevant, and multi-modal online learning environment.

Educational Game Design

This section of Chapter Five reviews seven game designs that serve educational purposes as showcased in Chapter Four. To facilitate optimal learning opportunities, avoid negative behavior transmittance through mirror neurons, and maintain the potential to reach younger audiences (middle or high school), these game designs utilized in the UoMT may provide useful ideas when designing educational games for all subjects. The common factor to maintaining educational value in games is the level of how integrated course content is within a game's design (dynamics, mechanics, activities, and aesthetics).

Content-Centered Approach

There are three main elements that need to maintain a content-centered approach: world building, activities, and enemies. World building may consist of naming or designing a singular location (one world or city) or various locations (regions within a world or districts within a city) after course vocabulary.

Activities require fully integrated course content. This is the difference between utilizing course content as pseudo-advertisement breaks in the game versus the course content being the very medium through which player interaction and student learning takes place. For example, the UoMT has fully integrated music theory and keyboard skills (learning) as part of nearly every action and activity. This can be contrasted with a traditional RPG, in which combat, the main activity of the game, is explained through magic (entertainment); concomitantly, the "learning aspect" is manifested through regaining energy to cast magic.[368] Minigames should also be

[368] Prodigy, "Make Math and English Fun for Kids," (Last Accessed on July 27, 2023), https://www.prodigygame.com/main-en/.

considered with a content-centered approach. For example, in the UoMT, players learn about instrument maintenance through minigames that resemble the real-life practices of instrument repair.

Enemies are also a great opportunity to facilitate learning. Villains and heroes in stories and movies are often quite memorable. Therefore, taking the time to design an enemy's appearance, mannerisms, speech, and attacks after a core concept may provide further reinforcement of the desired learning outcome. Further, non-playable characters (NPCs) which facilitate storylines and quests may also be references to historical and modern figures within a particular subject. For example, in the UoMT, there are guilds, groups, villains, and hero NPCs which play a vital part in the storyline, yet at the same time are a reference to their actual historical counterparts in real life, granting a semblance of knowledge regarding the historical figure they are designed after.

Inclusion of Cross-Disciplinary Material

The inclusion of interrelated material and cross-disciplinary subjects should be considered. This may add further interest to the game and facilitate student exploration of content and related subject matter that students may otherwise have never considered.

Elemental Inclusion

Element-based combat remains a popular aspect of many RPGs. Including element-based combat into a game may maintain familiarity with the genre and add aesthetic appeal. Elemental inclusion may be utilized as a learning opportunity by explaining and integrating the elemental properties with subject-related concepts, theories, formulas, or ideas. In this way, the game will maintain aesthetic appeal and facilitate learning. One example from the UoMT is the thermoacoustics branch of the Musicianship Skill Tree which introduces element-based combat

(the element of fire) while teaching students about natural and scientific sound phenomena regarding thermoacoustics (see Table 4.4).

Background Music

Players may spend a significant amount of time in any given area of the game. Therefore, utilizing or composing themes, songs, jingles, background, or foreground music that maintains content-based lyrics carries potential for learning opportunities. Even if this music has a longer instrumental component to its loop, the inclusion of lyrics to explain subject-related concepts is critical to optimizing the learning potential of any game. This utilization of background music may also be a way to familiarize students subliminally with masterworks of the genres (e.g., Medieval, Renaissance, Baroque, Classical, Romantic, 20th and 21st Century, etc.).

Training Centers

While the storyline and activities in a game may be educational and engaging, the game design should incorporate a location accessible from anywhere in the game that focuses solely on reinforcing or drilling course content. This location and its activities would take place outside of the story yet still facilitate rewards (experience points, loot, and in-game currency). While different difficulty levels and content of these training centers may exist, teachers would maintain the ability to unlock these areas to facilitate specific subject-related reinforcement for students outside of standard gameplay.

Summary of Prior Research

Prior research establishes the historic and current needs for student engagement and technological adaptability within the music curriculum; the literature gap for research on DGBL in general and specifically in the field of higher music education; and the legitimacy, benefits, concerns, and efficacy of implementing gamification, GBL, and DGBL into education. The

current state of research in the fields of gamification, GBL, and DGBL maintain higher application rates within the K-8 or K-12 spheres of education. Despite the research showcasing the benefits of gamification, GBL, and DGBL, many teachers remain skeptical regarding the utilization and efficacy of these learning methods.

Limitations

This project has four main limitations. The first limitation of this project is that it is only a proposal. The UoMT, though based on and supported by historic and current needs, research, and educational theories and pedagogies is only a proposal. This limitation highlights future production needs (finding and funding, a team of programmers, and designers) to produce the UoMT according to the proposed vision of educational value and efficacy.

The second limitation of this project is that while the UoMT covers many modes of learning and may be utilized as a supplemental learning tool or as a MIDI lab activity, there will always be exceptions to every learning rule. In other words, there is no guarantee that playing the UoMT will benefit every student. However, this limitation is mitigated to a small degree by the fact that the UoMT is meant to be a supplemental tool working together with traditional in-person and online learning, not to replace the educator, traditional classroom, or online learning.[369] Therefore, a combination of traditional and emergent learning methods may provide a large variety of preferred learning methods and modes.

The third limitation of this study comes from the requirement of each student requiring access to a MIDI and QWERTY keyboard setup to play the game efficiently (see Figure 4.1).

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[369] Andrew J. Lesser, "An Investigation of Digital Game-Based Learning Software in the Elementary General Music Classroom," *Journal of Sound and Music in Games* 1, 2, (2020):1-24. https://doi.org/10.1525/jsmg.2020.1.2.1

This limitation is mitigated slightly in that an in-game music keyboard is available to be played from the typing keyboard. However, utilizing a QWERTY keyboard in place of a MIDI keyboard minimizes the efficacy of the primary educational function of the UoMT: to assist students in the application of music core concepts. The requirement of a school computer lab or MIDI lab may also be a limitation to less-funded school districts and an opportunity in higher-funded school districts.

The fourth limitation is found in the increasingly subjective nature of advanced music core concepts. For example, Schenkerian Analysis contains significant elements that are subjective and to the point of having more than one "correct answer." More careful game design elements may be required to introduce these higher levels of music theory. The UoMT may be limited in its ability to introduce these higher-level concepts and may provide limited reinforcement opportunities.

Implications and Potential Impact of Findings

The implications and potential impacts of the findings are immense. The UoMT can be made available through academic institutions and business partnerships to a wide variety of music students worldwide. This availability potentially involves primary school students (grades 5-8), secondary students (grades 9-12), undergraduate, graduate, and even doctoral students. Further, the online nature of this game facilitates worldwide online access.

If proven successful at its claims of music efficacy and involvement, then the UoMT may provide an effective method for music theory students of any age to learn, review, and practice music core skills (MT, SRET, and KBS) in a fun, engaging, culturally relevant, and multi-modal method. Further, the UoMT may improve music literacy, course retention, and student engagement and satisfaction. The UoMT may also bring more attention and research to the

music core subjects (MT, SRET, and KBS), music-related subjects (i.e., physics, science, psychology, and mental health), DGBL, and motivational theories. The UoMT has the potential to include and teach a large array of music information beyond the music core courses and into music-related subjects such as the physics of sound and music, music-therapy, psychology, natural sciences, music administration, and music advocacy. The UoMT may also help students with their understanding of instrument performance, as part of the game design facilitates information regarding tuning systems, how weather affects the tuning of instruments, instrument fingerings, and performance technique.

Conclusion

The *Universe of Music Theory: Music Masters* maintains the potential to transform the landscape of the music theory classroom (in-person and online) and to elevate music theory to meet the needs and standards of the twenty-first-century music theory student, culture, and digital age. No longer will college or high school students maintain the same lack of interest in learning music theory. Music theory students will now have access to a fun, engaging, multi-modal, digital and educational learning game. Students may be persuaded to play the UoMT rather than spending their time on recreational games. Through utilizing intrinsic and extrinsic motivation, the UoMT may positively impact the level of student efficacy, engagement, satisfaction, comprehension, and musicianship.

Next Steps

The next steps of this project are to find funding through grants, institutions, or businesses that will promote and facilitate the UoMT project. This funding will take the *Universe of Music Theory: Music Masters* from theory to practice. Once this funding is acquired, development of the project and the consultation of various professional sources regarding how to

present in-game to facilitate consistent learning in parallel with a music theory course or music core curriculum. Recommendations for future game development mechanics, concepts, and research questions include an in-depth look into music academia, scientific and natural sound and music phenomena, the psychology of music and the psychology of playing games and the long-term effects on players; graduate and post-graduate music theory studies; and research into instruments outside the Western tonal system.

Recommendations for Future Study

The goal of this dissertation is to provide the UoMT as a game proposal and concept, not to test its effectiveness. The efficacy test may come later as a published study once the UoMT has been developed. This project has established evidence that testifies to the acclaimed efficacy and legitimacy of the UoMT as a learning tool in the form of post-talk reviews of existing literature and research already conducted on gamification, GBL, DGBL, and the psychology of playing games in the general fields of academia, higher education, and the music theory classroom (online or in-person).

Recommendations for future research include establishing qualitative and quantitative case study questions and surveys, getting IRB approval to test the efficacy of the UoMT on students of all ages and grade levels, and discovering the optimal age or grade level for implementing the UoMT as a learning tool. In time, various colleges, high schools, and middle schools in the United States of America will also be provided with an opportunity to participate in future efficacy, involvement, and behavioral studies based on playing the UoMT. Once these contacts are established and the UoMT is in a suitable testing stage, the eligible participants will be contacted, and the study involving supplemental learning with a music theory course for some determined amount of time will begin.

Case studies may also be performed while the UoMT is in development. Upon publication of future case study results, the UoMT may be ready to enter an official state of release. Further research and development may be conducted to expand the utilization of the game for the second-year undergraduate music theory students as well as students of the other music-related disciplines (academia, natural and scientific sound and music phenomena, and the psychology of music). The UoMT will be made available to any of the music-related courses that desire to introduce students to the concepts of music core skills, scientific and natural sound and music phenomena, and the psychology of music.

Appendix A: Curriculum Map

The following table presents the music theory and other music-related curricula that the students will experience as they progress throughout the game. Progression in the game is brought about through combat, puzzles, minigames, and other activities all based on praxial music application of the music core curriculum and other music-related subjects (music academia; natural and scientific sound and music phenomena; and the psychology of music). The following table demonstrates the anticipated levels of material introduction, reinforcement, and mastery. This table aims to introduce and reinforce music core content at a similar method as taught in class and is subject to change as more professionals are consulted and the game develops.

There will be a main quest line that is dedicated to teaching music core concepts in the order presented on the chart. However, the student may progress (level up) through side quests and without needing to cover every subject available to their current level. This allows students to maintain options of exploring multiple facets of the music core curriculum. Levels 1-20 are meant to cover what is taught in an “Introduction to Music Theory Course.” Levels 21-50 are meant to cover what is taught in the “First-Year of the Music Core Curricula.” Levels 51-80 are meant to cover what is taught in the “Second-Year of the Music Core Curricula.” Levels 81-100 may be reserved for review and future topics such as negative harmony.

Level Range	Topic I = Introduce	Topic R = Reinforce	Topic M = Master
1-5	The Staff • Treble, Bass, Alto • FACE, EGBDF • Note Identification Basic Rhythms 1 • Sixteenth, Eighth, Quarter, Half, Whole • Simple Meter Solfège		
6-10	Intervals Basic Rhythms 2 • Dotted and Tied Rhythms. • Compound Rhythms	The Staff Basic Rhythms 1	
11-15	Major Scales Minor Scales • Natural • Harmonic • Relative Major Key Signatures Minor Key Signatures	Intervals Basic Rhythms 2	
16-20	Triads • Major • Minor • Dim. • Aug.	Major Scales & Key Sig. Minor Scales & Key Sig.	The Staff Basic Rhythms 1 Intervals Basic Rhythms 2
21-25	Solfège	Major Scales & Key Sig.	

	Triad Inversions Roman Numerals (RN) Figured Bass (FB) Nashville Numbers (NN)	Minor Scales & Key Sig. Triads	
26-30	Basic Chord Progressions • I-IV-V-I • I-IV-V-vi 7th Chords	Solfège Triads + Inversions Cadences RN FB NN	Major Scales & Key Sig. Minor Scales & Key Sig.
31-35	7th Chord Inversions More Chord Progressions • So-Fa-Mi-Re-Do • Mi-Re-Do-Ti-Do	Solfège RN FB NN 7th Chords + Inversions	Triads + Inversions Cadences
36-40	Counter Point • 2nd Species • 3rd Species • 4th Species	RN FB NN	
41-45	Form and Phrasing • Binary • Ternary • Rondo	RN FB NN	
46-50	Cadences • PAC • IAC • HC • DC • Plagal Cadence	RN FB NN	
51-55	Secondary Dominants	7th Chords + Inversions	Solfège

	• V/V Secondary Leading Tones • vii/vi		RN FB NN 7^{th} Chords + Inversions.
56-60	Modulation • Enharmonic • Pivot Chord	Secondary Dominants Secondary Leading Tones	
61-65	Modes • I.D.P.L.M.A. Neapolitan Chord • *b*II^6	Secondary Dominants Secondary Leading Tones Modulation	
66-70	A6 Chords • German • Italian • French • Doubly Augmented	Modulation Modes Neapolitan Chord	Secondary Dominants Secondary Leading Tones
71-75	Sonata Form	Modulation Modes Neapolitan Chord A6	
76-80	Twelve Tone Matrix		Modulation Modes Neapolitan Chord A6 Sonata Form
81-85	Chord Extensions		

	Overtones Undertones		
86-90	Negative Harmony		
91-95			
95-100			

Appendix B: Addressing Issues

This Appendix addresses more issues as discussed in the beginning of Chapter Four. The headers of sections may maintain the same or similar titles to those of the issues they address as found in Chapter Two.

Practical Application and Significance

Through playing the UoMT, students will realize actual, notable, and significant course (MT, KBS, and SRET) goals. As directed by Guajardo et al.'s understanding of the learning process, the UoMT transforms data to information (through the mediating source of a game), to knowledge (understanding MT, KBS, and SRET principles), and finally, application (practice in-game and in the classroom). Guajardo et al. claim that "the real test of learning resides in the application."[370] Every core action of the UoMT addresses and facilitates content (MT, KBS, and SRET) application. The main form of entertainment and activities in the game consists of practical music theory, keyboard skills, and SRET comprehension, knowledge, application, and performance.

The Problems with *Kahoot!*

The UoMT seeks to incorporate all of the benefits found in *Kahoot!* (encouraging community, collaboration, communication between students; user-friendly interface; increase attention, motivation, concentration, and quality of learning; reinforcing learning in both a theoretical and practical sense; promotes efficient and progressive learning) while mitigating the disadvantages of *Kahoot!*. The following problems were identified from the utilization of

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[370] Guajardo et al., *Partnerships in Education*, 77.

Kahoot!: One, teachers needed to perform extra work to incorporate *Kahoot!* Into their curricula. Two, not all students preferred a digital game-based method of learning. Three, not all students preferred playing an active role in the classroom.

The UoMT will circumvent the discouraging nature of teachers having to perform extra work to adjust and incorporate the *Kahoot!*'s content into their lesson plans, because the UoMT will already be innately incorporated into the lesson plan of the music theory core program. The UoMT will be developed by music educators, scholars, and professionals with students in mind. Even if students venture into content not yet covered in class, there would be no detriment. Teachers would not need to concern themselves with keeping track of or grading the student's progression through the game as is already an acknowledged responsibility of educators.[371] The game will keep track of their students' online learning progress and the teachers and students will simply reap the benefits of reinforced learning.

In response to students who do not want to play an active role in the classroom, the UoMT is an online learning environment that does not require extrovert actions to participate and do well in. Students may feel more comfortable playing an "active role" online than they do in-person. The UoMT will facilitate a foundation for future research on the application of gamification, GBL, and DGBL that is needed to understand the interests and demands of modern students.

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[371] Brian C. Wesolowski, "Tracking Student Achievement in Music Performance: Developing Student Learning Objectives for Growth Model Assessments," *Music Educators Journal* 102, no. 1 (2015): 39. http://www.jstor.org/stable/24755629.

Addiction vs. Obsession

The UoMT is primarily designed to be a supplementary tool utilized in conjuncture with traditional in-person learning to maintain student engagement with the music-core curriculum throughout the school year including winter, spring, and summer vacations. Therefore, maintaining a positive and healthy addiction to the game throughout the year is equivalent to maintaining a positive addiction to exercising one's mind through praxial application of music-core content.

Obsession

In an attempt at preventing gaming disorder, the proposed game may facilitate an optional "playtime limit" mechanic. This mechanic would allow users to be prompted and reminded to log out once the time limit ends during or after an activity. The time limit may incorporate a default amount of 60 minutes or allow the player to set an alternate amount. However, it should be noted that this mechanic is only a reminder for the player to make a healthy decision and will not force the player to log out, that will be left to the player's own choice and willpower.

Gilyazova and Zamoshchanskii's Four Warnings

In response to the first warning, this danger of withdrawal syndrome and decreased efficiency of education and typical (non-gamified) classes, and specifically referring to students who are taking the music-core curriculum, this dissertation proposes that these dangers are mitigated to a degree due to the interconnected and praxial nature of the UoMT, being a digital game rooted in MT, KBS, SRET, and intertwined with other overlapping fields of music-based study (composition, performance, audiation, music academia, natural and scientific sound and music phenomena, and the psychology of music), intended to reinforce and promote the learning

and real-life or in-class application of music-core (MT, KBS, and SRET) courses. Therefore, for the music student, there is not an end to gamified learning. Students will be intrinsically motivated to participate in the classroom because classroom participation results in improved game competency and vice versa.

The UoMT addresses warnings two, three, and four in a couple of ways. One, the UoMT contains a balance between serious and game activity. Two, the UoMT is designed to conform with the psychological principles of the students and the pedagogical principles of the music-core curriculum. Three, the UoMT will prepare students for their life outside the music theory classroom in that everything in the game provides students opportunities to put what they learned into practice. Therefore, at least in reference to the proposed game concept, turning the learning of MT, KBS, and SRET into a game will promote and sustain the educational value of learning. Rather than the game being an escape from real-life responsibilities. The UoMT has the potential to promote real-life involvement with music.

Appendix C: Addressing Benefits

This section addresses the additional benefits of the UoMT that were discussed in Chapter Two. The headers of sections may maintain the same or similar titles to those of the issues they address as found in Chapter Two.

Evaluations and Feedback

The concept of "evaluations" in the world of education is the ability for the educator to understand and discern what went well and what could be improved in their teaching and in the students' understanding. The UoMT will be able to assist in providing feedback on which concepts students are or are not understanding. One of the features of the UoMT is the inclusion of the player's statistics (speed, accuracy, and comprehension) of their actions (MT, KBS,

SRET) during the real-time combat (music performance) and other music-based challenges. These statistics will be available for the player and the educator to review.

Improved Blended Learning

The UoMT can assist in the student's "progress toward course objectives, creating an effective learning environment," maintaining clear instruction, and facilitating fun and engaging opportunities to review, demonstrate, and apply their knowledge of learned music theory concepts all year round. The UoMT may add value to in-person, BL, or online music theory courses due to the nature of the game's online accessibility and focus on learning music theory concepts at a similar pace and in a similar order to that of most music theory core programs (see Appendix A).

Motivation Within Game Design

According to Gilyazova and Zamoshchanskii, higher education needs motivating and engaging approaches.[372] The UoMT offers a practical example of this exciting new motivational approach that could help revitalize music education.

Motivational Factors

This project aims to pursue a method of learning that will increase students' intrinsic motivation for practicing and reviewing music theory concepts.

From Schmidt's Motivation Variables, more intrinsic motivation leads to more practice time. The same comparison can be drawn in support for the proposed game concept in Chapter Four. An increase in students' intrinsic motivation to study, review, and practice music theory material will lead to higher test scores, comprehension, and retention.

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[372] Gilyazova and Zamoshchanskii, "Gamification in Higher Education," 41.

In response to Conway's warning on "no one technique or approach will work for every student," the UoMT will provide positive extrinsic motivators (in-game points, badges, and levels) intrinsic motivators (having fun) for students, new methods of re-phrasing problems (in-game combat, puzzles, exploration, and challenges), and covers a wide variety of preferred learning methods (VARK). Further, the UoMT may be utilized as an independent supplementary learning tool or as an integrated activity at an on-campus MIDI lab.

Autonomy, Competence, and Relatedness

The UoMT meets the needs of autonomy, competence, and relatedness as seen in the Self-Determination Theory. Students will maintain the autonomy to customize (make, name, and dress) their character; and choose an instrument, playstyle, and specialization of learning (i.e., MT, KBS, SRET; natural and scientific sound phenomena). Students will develop their competence at the game and their musicianship through practice inside and outside of the game (in the classroom) from MT-, KBS-, and SRET-based challenges, puzzles, and combat. Therefore, a competence in gameplay will result in a competence of real-life practical music-core skills and vice versa.

These core musicianship skills (MT, KBS, and SRET) that make up the foundation of the music-core curriculum will be the basis for the majority of gameplay (i.e., combat, challenges, puzzles, riddles, secrets, etc.) and challenge student competence. Students will be able to choose to participate against each other (player versus player PvP) or work together (player versus environment PvE) in combat, challenges, and puzzles. Students will experience relatedness in three ways.

One, the social connections with their peers and other online friends and music majors. These social connections between peers may not have formed without the unique game-based

experience and environment. Two, students (adult learners and digital natives) who have grown up with games, technology, and the internet, will be able to naturally relate to the digital and game aspects. Three, the music-core classes (MT, KBS, and SRET). The game concept emphasizes the skills that students will learn, are currently learning, and have already learned throughout their academic career in any music-core program.

Flow Theory

The game concept in Chapter Four will present challenges primarily in the form of music-based combat where the outcome is dependent on the student or the player's skill level and knowledge of MT, KBS, and SRET. Therefore, players will be free to autonomously choose which level of difficulty and core skill they want to pursue according to their own balance of difficulty and competence.

Addressing the concern of how educational content and assessments interrupt the flow state, the UoMT will keep the student's attention and "state of flow" by transforming the appearance of formative and summative quizzes, assessments, and exams within the game into praxial-based music theory-based activities, challenges, puzzles (and more) manifested in the form of MT-, KBS-, and SRET-based combat against different "enemy" types and "bosses." Further, these music-core-based enemies, bosses, and quests may be completed before or in preparation of a course assessment. In this way, the studying process can be re-imagined as students will experience fun in learning and reviewing music-core skills while playing through a mock-exam.

Worldwide Communities

Guillen and Zeichner note the importance of advocating for community-involvement and engagement in teacher education.[373] Suggestions for game updates, balances, feedback, and content revisions for the UoMT will be taken from academic (music education educators from all levels) and student communities. Music professionals and academics in sub-fields of music education, composition, performance and other overlapping fields (composition, performance, audiation, music academia, natural and scientific sound and music phenomena, and the psychology of music) will be consulted on how to implement teachings and information on their fields into the game. This consideration will facilitate learning, discussion, and engagement amongst professional music teachers and communities.

School District Benefits

The UoMT may also benefit school districts and music programs. According to Goodman et al., "School districts are inundated with requests to partner with them that do not always benefit the students or the school district. There are a lot of research opportunities that are not exactly partnerships."[374] The UoMT can appeal to students and may increase activity in or the expansion of a music program (music technology, general music, music theory, and performance ensembles). Growth in a music program will facilitate a deduction in payroll expenditures from the overabundance in the music teacher's FTE value (i.e., sixty students learning from one music

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[373] Lorena Guillen and Ken Zeichner, "A University-Community Partnership in Teacher Education From the Perspectives of Community-Based Teacher Educators," *Journal of Teacher Education* 69, no. 2 (2018): 140. Gale In Context: Biography (accessed February 6, 2023). https://link.gale.com/apps/doc/A530360299/BIC?u=vic_liberty&sid=summon&xid=872e90d0.

[374] Joshua S. Goodman, John McDonough, and Elizabeth Pauley, "Research, Partnerships, and Initiatives in Education || Radcliffe Institute," Harvard University, December 22, 2014, YouTube video., 54 min., 46 sec., https://www.youtube.com/watch?v=UmUDRwQIfJ8&t=2s.

teacher vs. three sets of twenty students learning from a math, science, and language arts teacher respectively).[375]

A Lack of Creative Continuity

As expressed by Kennedy, there is a historic need for continuing creative music education. Kennedy notes that the level of creativity between grade school, high school, and college is too great is disparagement. The UoMT may address this lack of continuity by maintaining gameplay that mirrors the levels of learned music-core skills (MT, KBS, and SRET) and facilitate the continuation of stimulating student engagement, growth, and learning from middle school, high school, and beyond.

What Digital Creativity Can Do

Minors et al. advocates and discusses the importance of digital creativity-inspiring strategies and technologies in the "[engagement, facilitation,] production, dissemination, and consumption, of [cross-discipline collaboration, digital literacy,] music, and music education."[376]

The UoMT is the very emblem of a digital creativity-inspiring, seeking, skills-oriented strategy and technology designed for the engagement, facilitation, production, dissemination, and consumption of cross-discipline collaboration, digital literacy, music, and music education. The formation of the UoMT facilitates and requires a cross-discipline effort in the fields of music core skills and music-related subjects (academia, phenomena, and psychology), computer

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[375] John L. Benham, *Music Advocacy: Moving from Survival to Vision*, Chicago, Illinois: GIA Publications, 2016, 151-152.

[376] Helen Julia Minors, Pamela Burnard, Charles Wiffen, Zaina Shihabi, and J Simon van der Walt, "Mapping Trends and Framing Issues in Higher Music Education: Changing Minds/Changing Practices," *London Review of Education*. 15, no. 3 (2017), 463. doi:10.18546/LRE.15.3.09.

science, and digital art. The UoMT aims to create within students a desire to learn and review music theory and inspire creativity to keep students engaged in music-related content. This project, therefore, aims to fill this gap in existing digital technologies for higher music education (HME).

Appendix D: UoMT Grant Proposal

Abstract

This project aims to provide a fun, engaging, and inspiring music core supplementary software entitled, the *Universe of Music Theory: Music Masters* (UoMT). This project will transform ordinary music core subjects (music theory, aural skills, and keyboard skills) into dramatized and engaging gameplay (combat, puzzles, codes, and secrets). The UoMT will incorporate other fields of academia that overlap or depend on sound and music. For example, music academia; natural and scientific sound and music phenomena; and the psychology of music. The UoMT will be founded principles that will promote modest and family friendly character creation and discussion. These principles help facilitate optimal learning opportunities through the incorporation of scientific-based sound and music phenomena, avoid negative behavior transmittance through mirror neurons, and maintain the potential to reach younger audiences (middle or high school). The UoMT maintains the potential to reach a large target audience all around the world and facilitate academic and business partnerships with music technology entities and music institutions.

Keywords: Higher music education, digital game-based learning, supplemental learning tool, student engagement

Introduction

Statement of Need

Music education is facing an academic engagement crisis. With the rise of the digital age, the current generation of digital natives have been immersed in technology, internet, and games. a digital learning game rooted in music theory and maintaining social boundaries guided by a Christian worldview may prove effective at meeting the needs of these students preferred learning methods and cultural relevancy and adapting to the digital age.

Objectives

This project intends to develop the *Universe of Music Theory: Music Masters* as a supplementary learning tool that will assist in keeping students engaged in music core courses, interested in the science behind sound and music, and promote lifelong involvement in music performance, advocacy, and education. As shown in Richards' dissertation, there is great support to suggest that this project will be successful both educationally and financially. As a supplemental learning tool, the UoMT may function inside of the classroom as a MIDI lab activity or outside of the classroom as a fun, engaging, and positively addicting learning game which serves to reinforce and review music core content from home. What the student learns in class will increase their in-game efficiency and what the student reviews in the game will increase their in-class efficiency.

Significance

The significance of this project is found in its potential to form communities of music-disciplined individuals (gamers, students, teachers, researchers, and scholars) all around the world; teach these communities; form connections between interdisciplinary fields of music

(science, physics, music theory, aural skills, keyboard skills, music administration, music advocacy, and more); provide a basis for future research and studies on the efficacy of the UoMT and digital game-based learning; and address the historical needs: 1.) keeping students enrolled and engaged in music classes, 2.) adapting integrating technology into music programs and curricula, and 3.) facilitating lifelong music involvement.

Methods

This project involves six phases (see Appendix B). The first phase files for the copyright, trademark, and patent for the *Universe of Music Theory: Music Masters* as well as for IRB approval. The second phase seeks funding through grants or business and educational partnerships. Once funding is acquired game development may begin. The third phase facilitates game development up to the point of being ready to test the game (the first World). Throughout this early development process, IRB approval will be requested to begin testing. Phase four involves testing the efficacy of the beta and making necessary adjustments and improvements. Phase five involves completing the development of the music core content, applying for more IRB testing, implementing the UoMT into college courses, marketing the game, and expanding the player and testing audiences. Phase six involves expanding beyond the core curriculum of music theory, SRET, and KBS. Phase seven involves expanding the game beyond the Western tonal system.

Action	Objective	Timeline	
Phase 1: File Copyright, Trademark, Patent. File for IRB approval.	Acquire Copyright, Trademark, Patent.	3-6 months.	
Phase 2: Acquire Funds/Fund the Project while maintaining minimum of 51% shares.	Acquire sponsors and game design/development teams. Begin game development.	6-12 months.	
Phase 3: Develop Game to an Alpha/Testing Stage	Get IRB approval for testing proto-type. Begin Efficacy Research/Tests.	12-24 months.	
Phase 4: Test the efficacy of Alpha Stage. -	Make adjustments/improvements	12-24 months.	
Phase 5: Complete Development of Music Core Content - IRB for more testing.	Implement in College Courses/Market the Game. Expand player and testing audience.	12-24 months.	
Phase 6: Expand beyond the Core Curriculum - Physics of Sound & Music - MM&L - Music Advocacy - Music and Psychology (the Brain) - Music History - Music Philosophy - Etc.	Multi-discipline involvement. Expand audience. Ready for more efficacy tests.	6-12 months.	
Phase 7: Expand beyond Western Tonal Music Theory	More Music Perspectives Expand audience.	12-36 months.	

Evaluation

The efficacy (improved student retention and test scores) of the UoMT will be evaluated periodically by comparing groups of students who are playing the game with groups of students who are not playing the game throughout a school term, break, or year. Qualitative and quantitative questionnaires and interviews will be conducted on participants and where applicable, their parents and friends to determine the level of player engagement, enjoyment, risk of addiction, social functions, and change in social behavior.

Budget

A proposed budget of $100,000 to begin game development is requested. Additional funds of up to $200,000 may be requested as the game continues to develop, require further research and development, and testing. While all of these costs are estimates, more stable figures will be available once a business partnership with a game development company is established.

Conclusion

This project aims to increase student engagement, efficacy, musicianship, and lifelong music involvement. The engaging methods of gameplay combined with the core concepts of music theory and the interdisciplinary study of other music- and sound-related subjects will address the Educational Engagement Crisis and the cultural context of the digital age and digital natives. This project has great potential to facilitate business and educational partnerships between the developers of UoMT and all levels of music educators; impact student involvement in music; and promote worldwide communities of gamers, students, scholars, and researchers.

Appendix E: Action Plan

This action plan summarizes an approximate plan and timeline for the development and research for the Universe of Music Theory: Music Masters.

Action	Objective	Timeline
Phase 1: File Copyright, Trademark, Patent. File for IRB approval.	Acquire Copyright, Trademark, Patent.	6-8 months.
Phase 2: Acquire Funds/Fund the Project while maintaining minimum of 51% shares.	Acquire sponsors and game design/development teams. Begin game development.	6-24 months.
Phase 3: Develop Game to an Alpha/Testing Stage	Get IRB approval for testing proto-type. Begin Efficacy Research/Tests.	6-18 months.
Phase 4: Test the efficacy of Alpha Stage. -	Make adjustments/improvements	6-12 months.
Phase 5: Complete Development of Music Core Content - IRB for more testing.	Implement in College Courses/Market the Game. Expand player and testing audience.	6-12 months.
Phase 6: Expand beyond the Core Curriculum - Physics of Sound & Music - MM&L - Music Advocacy - Music and Psychology (the Brain) - Music History - Music Philosophy - Etc.	Multi-discipline involvement. Expand audience. Ready for more efficacy tests.	12-18 months.
Phase 7: Expand beyond Western Tonal Music Theory	More Music Perspectives Expand audience.	12-24 months.

Appendix F: Future Case Study Methodology

This section details how one would conduct a future study utilizing the *Universe of Music Theory: Music Masters* (UoMT) once the game is complete or in a beta testing stage to test its effectiveness and gather qualitative and quantitative feedback from students.

Design

The philosophical worldview used in this study is pragmatism. The methodological approach of this project is an experimental longitudinal mixed methods and action research-based design that will serve as both a quantitative experiment and a qualitative case study or number thereof. The proposed multiplayer digital music theory-based game is an emergent and action-based research design that takes advantage of existing technologies such as existing capabilities for music notation software, games, and the internet. This research design facilitates collaborative institution or schoolwide efforts to promote deeper instruction, meaningful learning, new "possibilities, define terms of effective curriculum, enhance curriculum, instruction, and assessment methods."[377] Utilizing quantitative data to measure the efficacy of the UoMT and qualitative data to measure the satisfaction, motivation to and amount of time spent practicing instruments in real life (see Appendix H).

The qualitative approach will be looking to understand the meaning the groups of participants ascribe to playing the game. Is the game effective? Is the game fun? Is the game addicting? Do the participants feel more prepared for the next music theory class after playing the game the night before? Do the participants feel that the game has prepared them for music

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[377] Monica Taylor, "Assessment and Action Research in Music Education," (video lecture in MUSC 801 at Liberty University, Lynchburg, VA, 2021); Monica Taylor, "Future of Music Education Post-Vision 2020," (video lecture in MUSC 801 at Liberty University, Lynchburg, VA, 2021).

theory quizzes, tests, and exams? Did the game make learning music theory fun? Would the participants play the game over the summer or throughout the school year? Does playing the game cause students to want to practice and learn music theory or perform in real life?

This study will rely on qualitative text and image data to record student responses of satisfaction and perceived efficacy derived from case studies. This study will rely on quantitative data to determine the amount of learning benefit the game has provided. The qualitative survey will facilitate open-ended questions such as, “How has playing the UoMT helped you learn and retain what you have learned in your music classes, if at all?”, “What do you enjoy the most about playing the UoMT?”, and “After playing the UoMT, how inspired do you feel to practice your music theory skills in real life (i.e. learn or play an instrument, compose music, sing, or learn about another subject explored in the game)?” (see Appendix G).

The quantitative study will primarily be in the form of music theory quizzes or tests at the beginning, middle, and end of the study periods which will allow researchers to measure the amount of improved through the same tests being given at each intervallic period to measure retention and increasingly difficult tests to measure improvement. Further, quantitative data will be collected as statistical information from the players’ progress throughout the game which represents their competencies and growth in MT, KBS, and SRET. This data may be displayed as charts, graphs, and other infographics.

Participants

The primary participants for this study would be undergraduate music theory students. However, this study can also find relevance with a much larger field of participants. Students of all ages and levels of musicianship and schooling are eligible for this study. This is because of the game’s wide audience appeal and its potential to further advance research in the field of GBL

among K-12, secondary, and tertiary students. The design of the game is such that as long as one has a basic understanding of how to utilize a computer, mouse, keyboard and MIDI keyboard, that they can play, participate, and learn.

This study maintains two overarching groups of participants. Participants during a term or school year and participants (returning or new) during summer break. In the case of the school-year participants, a secondary set of participants would be needed as an unaltered population. Meaning, one group of students maintain access to the learning game for the duration of the survey and the second group would not. The school-year case study/survey will also include a third group of participants. This group will start the term or year of music theory without having access to the UoMT and halfway through the term or year, they will be allowed access. The second over-arching group will be in the summer. This summer survey and case study will involve students from the previous study and students who were not included in the previous study. In this way, researchers can draw a comparison between the exam scores, retention, competence, and satisfaction of both groups of students.

Setting

The online nature and digital nature of the proposed game concept enables a physical setting anywhere (at home or at school) with a computer (or laptop) and MIDI keyboard setup. The home environment may facilitate a safe, calm, and comfortable environment for students. The classroom or school environment may facilitate a nurtured and cooperative learning environment and experience where students play the game in the same room (a computer lab) with their peers. The game itself provides a community-based social setting that is centered on making learning and practicing course material (MT, KBS, SRET) fun and engaging.

Instrumentation

The instrumentation that will be utilized are qualitative and quantitative surveys and interviews with participants who are willing. Test scores may be examined and compared using graphs, charts, and other infographics. Computers will be the main method of utilizing instrumentation and information. Participants will maintain the choice of answering the survey electronically on a computer, on a physical piece of paper, or in the form of an interview. The game itself is also an instrument involved in the study. The game will record the participant data tracking and being able to display to the student, teacher, and researcher alike, the areas of music theory that the student is having success and difficulty in.

Procedures

The data collection procedure involves five steps:

1. The first step involves identifying college, high school, and middle school students who would be eligible for participation.
2. The second step involves sending out participant requests to both the school district or university as well as the eligible participants, securing participation and if needed, getting parent or guardian permission, or at the very least, parental acknowledgement for participants under eighteen.
3. The third step involves testing participants will be tested on their current knowledge and interest of MT, KBS, and SRET before playing the game.
4. The fourth step involves allowing time to pass from one term to the next for the duration of the testing period while collecting qualitative and quantitative data regarding the game's efficacy in inspiring motivation for real-life music practice and music theory knowledge acquisition and retention, and student engagement and satisfaction levels.

Results inquiring about a state of addiction will also be documented, if possible, with the help of parents and guardians who may best describe their any change of the participant's attitude or behaviors.

5. The fifth step involves collecting, analyzing, and comparing the data from the experiment and control groups. Preferably this data will be collected and analyzed as each test, survey, and interview is taken.

As players progress in the game, their data (speed, accuracy, and comprehension of notes, rhythms, dictation exercises, etc.) will be stored as part of the player's in-game statistical information. This data can be automated to manifest as charts, graphs, or the like at a click of a button. During the mid-point and the end point of the testing period, participants will be tested on their music theory knowledge, retention, and interest. These tests will repeat for each testing period.

Timeline					
	Step 1: Participant Identification	**Step 2:** Participant Requests	**Step 3:** Pre-Test, Survey, and Interview	**Step 4:** Data Collection	**Step 5:** Data Analysis
Time:	2-4 months	2-4 months	1-2 months	6-12 months	Concurrent with Step 4.
Liable:	PR Lead	PR Lead	Researchers	Researchers	Researchers

Data Analysis

The data will be analyzed and sorted according to the overarching theme: Term-Based (Group 1) or Summer-Based (Group 2). Next the data will be further divided into the subdivisions that the participants were apart of. Sub-Group A, represented as Group 1-A,

maintaining access to the game from the start of the term. Sub-Group B, represented as Group 1-B, maintaining access to the game from the mid-point of the term. Sub-Group C, represented as Group 1-C, not having access to the game at all.

Students in Group 2 will be set up to take a music theory retention exam at the beginning of the Fall term. Group 2-A will be students who maintain access to the game from the beginning of the summer. Group 2-B will be students who maintain access to the game from the mid-point of summer. Group 2-C will be students who do not maintain access to the game at all during the summer. The point of the summer group is to measure the participants' retention of course material and to determine if the game is fun enough that students will willingly and actively choose to play it in their spare time.

It is important to note that the time spent playing the game may also be a factor and a further subdivided group. One group with an imposed time limit and one group with no time limit. The amount of time limited to the student can also be another determinate factor from an allotted 20 minutes to 120 minutes or more. This factor of time can be studied to determine how addictive the game is or if placing a time limit on the game creates a dislike for the activity.

Once the data is compiled, comparisons will be made within the sub-divisions of both Groups 1 and 2. Further comparisons can be made across the groups of participants as well. For example, comparing Groups 1-A, 1-B, and 1-C with each other versus comparing Groups 1-A with 2-A.

The desired time for this study would be a full academic year. In this way, Group 1 can keep its gameplay limitation each term, or swap the participants to a different limitation (i.e., Group 1-A becoming Group 1-B). Further, the question of whether or not students from Group 1 should be the same set of participants as Group 2 can be explored. The results may vary if the

participants have never played the game before. The setting and association of the game setup for first-time players in a classroom setting versus an at-home, summer vacation setting may impact the desire to play the game.

According to Wheeler, "grants are one-way institutions develop and test programs with the expectation that if they are successful, they will be adopted."[378] Therefore, one may attempt to acquire grants from institutions or businesses interested in developing this project and produce enough material for one term of an introductory music theory or music theory one course. In this way, researchers may discover insights regarding the impact that the UoMT has on student efficacy, motivation, engagement, and music involvement in the classroom, at home, and retention over vacation breaks.

[378] Wheeler, *Servant Leadership in Higher Education*, 116.

Appendix G: Qualitative Surveys

These qualitative surveys are meant to be given to subjects within their organized groups (1-A, 1-B, 1-C, 2-A, 2-B, and 2-C) and to test the acclaimed benefits of game-based learning as discussed in Chapter Two. Term-Based (Group 1) or Summer-Based (Group 2). Sub-Group A, represented as Group 1-A, maintaining access to the game from the start of the term. Sub-Group B, represented as Group 1-B, maintaining access to the game from the mid-point of the term. Sub-Group C, represented as Group 1-C, not maintaining access to the game at all.

Students in Group 2 will be set up to take a music theory retention exam at the beginning of the Fall term. Group 2-A will be students who maintain access to the game from the beginning of the summer. Group 2-B will be students who maintain access to the game from the mid-point of summer. Group 2-C will be students who do not maintain access to the game at all during the summer. The point of the summer group is to measure the participants' retention of course material and to determine if the game is fun enough that students will willingly and actively choose to play it in their spare time. While the target audience of these case studies would be college students, some questions are proposed for future case studies involving children or teenagers.

The Universe of Music Theory Qualitative Survey [number/section]

Subject #:_____ **Grade:_____**

Sex: Male ☐ Female ☐ Age:_____

Directions: For each question, please reply honestly and to the best of your recollection in the space provided below each question. Please ask a researcher for extra paper and specify the question number. For example, "May I please have more paper for Question one?" Your responses will be kept confidential and your identity anonymous.

Section One: Testing Efficacy

1.) How has playing the UoMT helped you learn and retain what you have learned in your music classes, if at all?

_____

_____

_____

_____

_____

2.) After playing the UoMT, how inspired do you feel to practice your music theory skills in real life (i.e. learn or play an instrument, compose music, sing, or learn about another subject explored in the game)?

_____

_____

_____

_____

_____

3.) Can you demonstrate any of the music theory knowledge you have learned below? It can be any concept you have explored while playing the game.

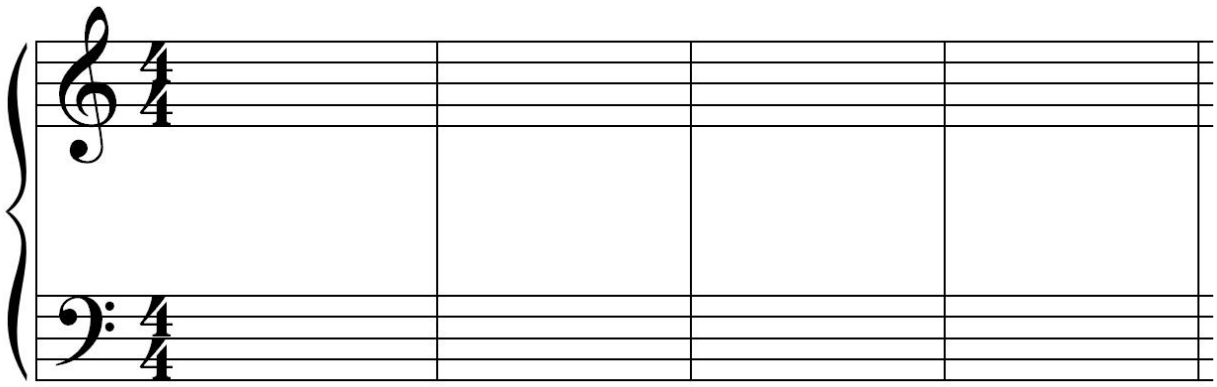
_____

_____

_____

_____

_____



Section Two: Player Engagement and Enjoyment

1.) What do you enjoy the most about playing the Universe of Music Theory: Music Masters?

2.) What about the UoMT's game and combat mechanics are user-friendly or intuitive?

_____

3.) What about the UoMT's game and combat mechanics are not user-friendly or intuitive?

_____

_____

_____

_____

_____

4.) What about the UoMT's game and combat mechanics can be improved?

_____

_____

_____

_____

_____

5.) For participants younger than eighteen, *please allow your parent or legal guardian to answer this question: After watching your child play the UoMT, are you interested in learning music theory, aural skills, or keyboard skills?

_____

_____

_____

_____

_____

6.) For participants younger than eighteen, *please allow your parent or legal guardian to answer this question: After watching your child play the UoMT, have you tried playing the game? If you have, please describe your experience. If you have not, please explain why.

_____

_____

_____

_____

_____

Section Three: Addiction

1.) Do you think playing the UoMT will lead to an unhealthy game addiction or obsession?

_____

_____

_____

_____

_____

2.) While playing the UoMT, have you ever found yourself playing for longer than you originally planned?

_____

_____

_____

_____

_____

3.) For participants younger than eighteen, *please allow your parent or legal guardian to answer this question: Have you noticed any new or different behaviors (i.e., positive or kind attitude and actions, negative or rude attitude and actions, increased or decreased practice time) since your child began playing the UoMT?

Section Four: Social Functions

1.) Do you play the UoMT with your friends or classmates? If so, do you believe playing the UoMT together has improved your ability to interact with and socialize with them in real life? If not, would you enjoy playing the game with friends?

2.) Have you been able to connect or talk more with your peers who are also playing the UoMT now than you did before you played the UoMT?

Appendix H: Quantitative Surveys

These quantitative surveys are meant to be given to subjects within their organized groups (1-A, 1-B, 1-C, 2-A, 2-B, and 2-C) and to test the acclaimed benefits of game-based learning as discussed in Chapter Two. Term-Based (Group 1) or Summer-Based (Group 2). Sub-Group A, represented as Group 1-A, maintaining access to the game from the start of the term. Sub-Group B, represented as Group 1-B, maintaining access to the game from the mid-point of the term. Sub-Group C, represented as Group 1-C, not maintaining access to the game at all.

Students in Group 2 will be set up to take a music theory retention exam at the beginning of the Fall term. Group 2-A will be students who maintain access to the game from the beginning of the summer. Group 2-B will be students who maintain access to the game from the mid-point of summer. Group 2-C will be students who do not maintain access to the game at all during the summer. The point of the summer group is to measure the participants' retention of course material and to determine if the game is fun enough that students will willingly and actively choose to play it in their spare time.

The Universe of Music Theory Quantitative Survey [number/section]

Subject #:_____ **Grade:_____**

Sex: Male ☐ Female ☐ Age:_____

Directions: Please **check the box** that you agree with the most. All answers will be kept confidential and your identity anonymous.

Section One: Testing Efficacy

1.) Please mark the box that aligns most closely with your experience playing the UoMT.

	1	Playing the UoMT has not helped me learn or retain anything at all.
	2	Playing the UoMT has helped me learn or retain a little bit of information.
	3	Playing the UoMT has helped me learn and retain entire chord progressions and more!
	4	Playing the UoMT has helped me learn and retain to such an extent, that I am ready to retake my last music theory, aural skills, or keyboard exam!
	5	Playing the UoMT has helped me learn and retain to such an extent that I am ahead of my class and course lesson!

2.) Has playing the UoMT inspired you to practice your music theory skills in real-life outside the game (i.e. learn or play an instrument, compose music, sing, or learn about another subject explored in the game)?

	1	I maintained less real-life practice outside the game, since I began playing.
	2	I maintained the same amount of practice as I did before playing the UoMT.
	3	I maintained a small (5-20 minutes) amount of increased practice time since I began playing the UoMT.
	4	I maintained a moderate (30-60 minutes) amount of increased practice time since I began playing the UoMT.
	5	I maintained a large (60-120 minutes) amount of increased practice time since I began playing the UoMT.

Section Two: Player Engagement and Enjoyment

1.) How much did you enjoy playing the UoMT?

	1	I did not enjoy playing the UoMT.
	2	I enjoyed playing the UoMT a little (20-30 minutes).
	3	I enjoyed playing the UoMT a moderate amount (30-90 minutes).
	4	I enjoyed playing the UoMT enough to progress in the game (90-120 minutes).
	5	I could play the UoMT for hours on end (120+ minutes).

2.) How user-friendly or intuitive is playing the UoMT?

	1	The UoMT is not user-friendly at all.
	2	The UoMT is somewhat intuitive.
	3	The UoMT is fairly intuitive, but could be better.
	4	The UoMT is user-friendly and intuitive enough that my parents could play.
	5	The UoMT is so user-friendly, my grandparents could play.

3.) After playing the UoMT, do you feel more interested in music classes?

	1	After playing the UoMT, I am not any more interested in music classes.
	2	After playing the UoMT, I am only interested in one of the music core concepts.
	3	After playing the UoMT, I am interested in all of the music core concepts.
	4	After playing the UoMT, I want to learn more about the science behind music.
	5	After playing the UoMT, I want to learn all there is to know about music!

4.) After playing the UoMT, do you feel would you take any of the following classes?

	Music and the Brain
	The Physics of Sound and Music
	Ethnomusicology
	The Power of Music
	Sound, Music, and the Elements
	Music Theory
	Aural Skills
	Keyboard Skills
	Ensemble Performance
	Solo Performance
	Classical Music
	Baroque Music

Section Three: Addiction

1.) How many hours do you think it is healthy to play the UoMT?

	1	A tiny amount: 0-1 hours.
	2	A small amount: 1-2 hours.
	3	A moderate amount: 2-3 hours.
	4	A large amount: 3-4 hours.
	5	An excessive amount: 4+ hours.

2.) How many hours on average have you been playing the UoMT per day?

	1	A tiny amount: 0-1 hours.
	2	A small amount: 1-2 hours.
	3	A moderate amount: 2-3 hours.
	4	A large amount: 3-4 hours.
	5	An excessive amount: 4+ hours.

3.) How addicted do you feel to playing the UoMT?

	1	Not at all addicted: I would rather practice outside the game.
	2	Only a little bit addicted: Practicing in the game is fun enough to play in my spare time.
	3	Fairly addicted: I'm comfortable playing for 1-2 hours.
	4	Largely addicted: I'm comfortable playing for 3-4 hours.
	5	Excessively addicted: It's the first thing on my mind when I wake up and go to sleep.

Section Four: Social Functions

1.) To what extent has playing the UoMT with friends affected your friendships?

	1	I am no longer friends with them anymore.
	2	Playing the UoMT causes small fights between me and my friends.
	3	Playing the UoMT has positively affected my friendships in a small way.
	4	After playing the UoMT, I made new friends.
	5	After playing the UoMT, I made lots of new friends who I may not have been friends with if not for the game.

2.) What impact has playing the UoMT had on your social interactions outside of the game?

	1	I ignore all of my responsibilities and obligations just to play.
	2	I prefer to stay in my room and not socialize or be interrupted by others when playing.
	3	Playing the UoMT has not affected my social interactions with others outside the game at all.
	4	Playing the UoMT has enabled me to be more social with others outside the game than I was before.
	5	Playing the UoMT has inspired me to interact, socialize, and perform music with others.

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