D. A. KOLB'S THEORY OF EXPERIENTIAL LEARNING: IMPLICATIONS FOR

THE DEVELOPMENT OF MUSIC THEORY INSTRUCTIONAL MATERIAL

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This research project evaluates the effectiveness of specific music theory instructional strategies in terms of D. A. Kolb's theory of experiential learning and Kolb's typology of individual learning style. The project provides an original methodology for the adaptation of music theory instructional material to the individual learning style types described in Kolb's typology. The study compares the relative effectiveness of two music theory instructional sequences, one of which is adapted for all of the learning style modalities described in Kolb's typology, and the other adapted for only a limited number of Kolb's learning style types. In order to compare the potential "learning outcomes" produced by these instructional sequences, a detailed study is proposed, in which computer based instruction (CBI) will deliver the instructional sequences to research participants and electronically record the participants' responses. The current study demonstrates the effective aspects of the original methodology and suggests methods for the successful adaptation of music theory instructional material to individual student learning styles.

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TABLE OF CONTENTS

ILLUSTRATIONS

TABLES

CHAPTER I

INTRODUCTION

This research project evaluates the effectiveness of a specific methodology for the adaptation of music theory instructional material to individual student learning styles. The methodology derives from D. A. Kolb's theory of "experiential learning" and Kolb's typology of individual learning style. The study compares the relative effectiveness of two music theory instructional sequences, one of which is adapted for all of the learning style modalities described in Kolb's typology, and the other adapted for only a limited number of Kolb's learning style modalities. The project proposes a study of the learning outcomes produced by the two instructional sequences. In the proposed study, computer based instruction (CBI) will deliver the instructional sequences to research participants and electronically record participants' responses. The proposed study may demonstrate effective aspects of the specific methodology and suggest methods for the successful adaptation of music theory instructional material to individual student learning styles.

Undergraduate students often find music theory courses to be an extremely difficult and sometimes frustrating experience. The difficulty may stem from the tendency of music theory instruction to rely heavily on the learner's ability to process information with abstract modes of cognition. Many students have either limited experience with abstract intellectual tasks or limited aptitude for abstract modes of cognition. The current research project explores the process of adapting instructional material for the learning styles of individual students.

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Individuals use a variety of methods during the learning process and each individual has a preferred style of learning. The term "learning style" describes several distinct cognitive models for the learning process, some of which differ significantly from each other. Most theoretical paradigms, however, refer to "learning style" as the dominant cognitive modality an individual chooses for the process of learning.

D. A. Kolb has proposed a typology of individual learning styles based on the theory of experiential learning. The typology, detailed in Kolb's *Experiential Learning; Experience as the Source of Learning and Development*,[1] derives from the manner in which an individual tends to "apprehend" new information, and the methods that an individual tends to use when processing new concepts. An instructor can employ Kolb's typology during the process of developing instructional material, so that each of Kolb's learning style "types" will benefit from appropriately adapted instruction.

The current project attempts to evaluate the effectiveness of music theory instructional material in terms of Kolb's experiential learning theory and his typology of individual learning styles. In the proposed study, computer based instructional sequences, created for this project, will be evaluated, and the pre-test vs. post-test scores of participants will be analyzed in order to determined the varieties of "learning outcomes" produced from the instructional sequences. The instructional material within the different computer based sequences describes the same music theory concepts, but each sequence is targeted for different elements of Kolb's learning style typology. Since the

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[1]David A. Kolb, *Experiential Learning; Experience as the Source of Learning and Development* (Engelwood Cliffs, New Jersey: Prentice Hall, 1984).

instructional strategies are derived from Kolb's typology, the learning outcomes can be examined in terms of the principles of Kolb's theory of experiential learning.

Analysis of data from the proposed project may assist the development of increasingly effective instructional material for music theory. The adaptation of instructional material for individual student learning styles requires the systematic application of learning style theory to the process of development, and a procedure for testing and evaluating new material. Music theory classes can become more stimulating and less frustrating for all students if the full variety of individual learning style is considered during the development process of instructional material.

CHAPTER II

INDIVIDUAL LEARNING STYLES AND D. A. KOLB'S

THEORY OF EXPERIENTIAL LEARNING

Each person represents a unique combination of personality traits, intellectual

aptitudes, and cognitive tendencies. As a result, people prefer to learn in different ways.

Differences in perceptual preferences for learning, tendencies towards kinesthetic vs.

tactile cognition, and aspects of individual personality characteristics define individual

learning style. Research in the field of individual learning styles can benefit the process

of developing instructional material by identifying the needs of learners who possess the

full range of human cognitive tendencies.

The term "learning style" refers to a variety of theoretical constructs and cognitive

models. Some of these various paradigms differ from each other in significant ways;

however, most of the theoretical structures that use the term "learning style" relate to the

concept of individual differences in the dominant cognitive modality used for the learning

process. Schmeck (1983) defined "learning style" as a predisposition to adopt a particular

learning strategy regardless of the specific demands of the learning task.[1] Some of the

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[1] Schmeck's definition of learning style is given in "Learning Styles of College Students" in *Individual Differences in Cognition* (New York: Academic Press, 1983).

most significant studies on learning styles theory include Fox (1984)[2] and Armstrong & McDaniel (1986),[3] who assess learning styles among adult learners in various post secondary environments, Eiszler (1982),[4] who studies the learner's preferred sense modality, and Riding & Boardman (1983),[5] who study adult learning style in terms of performance on the Test of Embedded Figures (Cuthbert, 1971).[6]

A variety of psychometric instruments have been developed to assess the preferred learning style of an individual, most of which describe bipolar pairs of

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[2]R. D. Fox, "Learning Styles and Instructional Preferences in Continuing Education for Health Professionals: A Validity Study of the LSI," *Adult Education Quarterly* XXXV (1984): 72-85.

[3]P. Armstrong and E. McDaniel, "Relationships Between Learning Styles and Performance on Problem-Solving Tasks," *Psychological Reports* LIX (1986): 1135-8.

[4]C. F. Eiszler, *Perceptual Preferences as an Aspect of Adolescent Learning Styles* (Washington, DC: U.S. Educational Resources Information Center, 1982). ED 224769.

[5]R. J. Riding and D. J. Boardman, "The Relationship Between Sex and Learning Style and Graphicacy in 14 Year Old Children," *Educational Review* XXXV (1983): 69-79.

[6]C. Cuthbert, *Test of Embedded Figures*, unpublished test.

specific personality traits in a manner derived from Jungian theories of "types."[7] Some researchers have attempted to extend upon Kolb's model by blending the concept of experiential learning with concepts from other approaches to the issue of learning styles. Merritt & Marshall (1984)[8] and Sewall (1986)[9] have studied the psychometric properties of the various learning styles instruments.

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[7]The Grasha-Riechmann Student Learning Style Scales were designed to study the learning styles of late post-secondary and university students. The instrument recognizes three bipolar pairs of learning styles, similar to the opposites found in the Myers-Briggs and Hogan-Champagne instruments, and also similar to Jungian theories of "types."

The Myers-Briggs Type indicator attempts to measure and identify an individual's personality profile based on Carl Jung's typology of conscious functioning. Jung described three bipolar pairs to which Myers-Briggs adds a fourth: Introversion-Extraversion, Thinking-Feeling, Intuition-Sensing, and Judging-Perceiving.

The Personality Style Indicator, designed by R. Craig Hogan and David W. Champagne, is based on the Myers-Briggs indicator and also reflects the Jungian typology of conscious functioning. It also describes four bipolar pairs: Introvert-Extrovert, Thinking-Feeling, Intuitive-Sensing, and Perceiving-Judging.

The text of many psychometric instruments can be found on various sites on the world wide web and are frequently re-published in a variety of printed media. The Grasha-Riechmann Student Learning Style Scales have been published in many of the authors' works including Grasha's *Teaching with Style; A Practical Guide to Enhancing Learning by Understanding Teaching & Learning Styles* (Pittsburgh, Pennsylvania: Alliance Publishers, 1996). The Myers-Briggs Type Indicator is distributed by Consulting Psychologists Press, http://www.cpp-db.com. The Hogan-Champagne Personality Style Indicator is published privately by the authors, but the text of this instrument can be found on the world wide web.

[8]S. L. Merritt and J. C. Marshall, "Reliability and Constructive Validity of Ipsative and Normative Forms of the Learning Style Inventory," *Educational and Psychological Measurement* XXIV (1984): 463-72.

[9]T. J. Sewall, *The Measurement of Learning Style: A Critique of Four Assessment Tools* (Washington, DC: U.S. Educational Resources Information Center, 1986). ED 267247.

Kolb's typology describes individual learning style in terms of both the preferred modality for "apprehension" of new information and the preferred modality for processing new information. Kolb's identification of learning style "types" allows instructional information to be adapted for the specific needs of each category of learners. This research project studies the learning outcomes produced by music theory instructional material adapted for the needs of all of Kolb's learning style "types" compared to material adapted for a limited number of learning modalities.

D. A. Kolb's Theory of Experiential Learning provides a model for the process of knowledge acquisition and posits a typology of individual learning styles. Kolb's theory attempts to describe the underlying structures of the learning process and is derived from research in the fields of education, psychology, and epistemology, especially the work of John Dewey, Kurt Lewin, and Jean Piaget. The theory of experiential learning can be applied to the development of music theory instructional material and to the design of music theory curricula.[10]

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[10]The theory of experiential learning is described in Kolb's *Experiential Learning; Experience as the Source of Learning and Development* (Engelwood Cliffs, New Jersey: Prentice Hall, 1984). David A. Kolb is the DeWindt Professor in Leadership and Enterprise Development at the Weatherhead School of Management, Case Western Reserve University. He is known for his research on learning styles and was the originator of the theory of experiential learning.

Kolb's experiential learning model describes a learning cycle in which experience leads to observation and reflection, followed ultimately by concept formation. New concepts, in turn, may guide choices for new experiences. The theory maintains that knowledge is acquired either by concrete experience or abstract conceptualization and that knowledge is processed through reflective observation or active experimentation. Kolb theorized that a person first has a concrete experience and then makes reflective observations about it; these reflective observations will eventually form the basis of abstract conceptualizations as the individual fits the observations into generalized theories. A person will then ultimately test these theories through active experimentation. Figure 1 is a representation of the learning cycle.[11]

Kolb's typology of learning styles is derived from the relative emphasis an individual places on the different stages of the learning cycle. The tendency for knowledge to be acquired in an abstract versus a concrete cognitive modality (in terms of concrete experiencing compared to abstract conceptualization) is described as a distinct dimension of learning style; and the tendency for knowledge to be transformed in a reflective versus an active cognitive modality (in terms of reflective observation compared to active experimentation) is described as another distinct dimension of learning style. Figure 2 represents the two distinct dimensions of learning style as x and y axes and Kolb's four learning style types as the quadrants created by the intersection of the two axes.
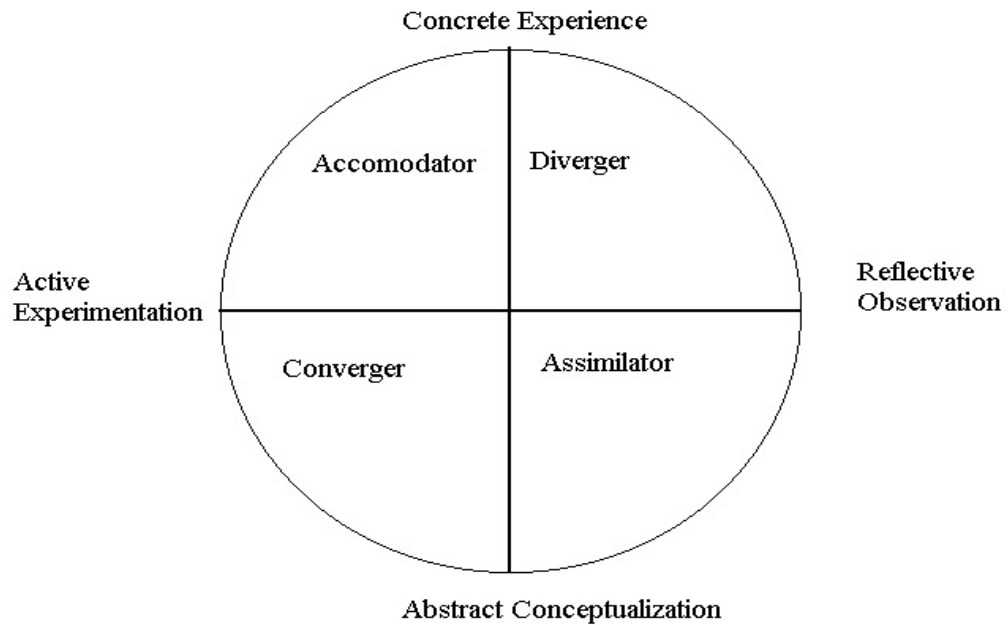
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[11]Figures 1 and 2 are derived from Kolb's description of the learning process in *Experiential Learning* (1984), pp. 20-38.

Figure 1. The Learning Cycle

Concrete   Reflective   Abstract   Active
Experience→   Observation→   Conceptualization→Experimentation

Figure 2. Learning Style Modality as *x-y* axes and Learning Style Types as Quadrants

Kolb's cognitive dimension of active-experimentation vs. reflective-observation can be compared to the epistemological concept of "extension" vs. "intention." Carl Jung equated the concept of extension with the extroverted personality type (analogous to Kolb's cognitive modality of active-experimentation) and the concept of intention with the introverted personality type (analogous to Kolb's cognitive modality of reflective-observation). Jung also suggested a connection between extension and the concept of *esse in re*, and between intention and the concept of *esse in intellectu*.[11] In a similar manner, Kolb's cognitive dimension of concrete-experience vs. abstract-conceptualization can be compared to the epistemological concept of "apprehension" vs. "comprehension;" with apprehension being analogous to Kolb's cognitive modality of concrete-experience, and comprehension being analogous to Kolb's cognitive modality of abstract conceptualization. William James observes that many languages express the distinction between apprehension and comprehension, and provides examples, such as *noscere* vs. *scire* in Latin, *kennen* vs. *wissen* in German, and *connâitre* vs. *savoir* in French.[12]

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[11]Jung describes the process that Kolb refers to as the "acquisition" of knowledge in *Psychological Types*.

[12]James describes the process that Kolb refers to as the "transformation" of knowledge in *The Principles of Psychology*.

William Shakespeare distinguished between the connotations of "apprehend" and

"comprehend" in the last act of *A Midsummer Night's Dream*.[13]

> Lovers and madmen have such seething brains,
> Such shaping fantasies, that apprehend
> More than cool reason ever comprehends.

The theory of experiential learning serves as the foundation for Kolb's research

concerning individual learning styles. Kolb developed a psychometric instrument known

as the Learning Style Inventory (LSI) which attempts to determine the types of learning

style modalities an individual tends to use most often. The original Learning Style

Inventory was developed in 1974, but Kolb and others have continued to improve and

update the inventory since that time, as well as to develop other similar psychometric

instruments.[14]

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[13]These lines are found in William Shakespeare's *A Midsummer Night's Dream*, V/i/4-6.

[14]The Learning Style Inventory is a self-description test based on experiential learning theory. The LSI obtains four measures for learning style: Concrete-Experiencing (CE), Abstract-Conceptual (AC), Reflective-Observational (RO), and Active-Experiencing (AE). In addition, two other scores are computed from these four; CE subtracted from AC indicates the degree to which the learning style is biased toward abstraction or concreteness, and AE subtracted from RO reflects a bias toward reflection or activity. Kolb's LSI is distributed by McBer & Company in Boston, Massachusetts, http://trguk.haygroup.com, see also Donna M. Smith and David A. Kolb, *The User's Guide for the Learning-Style Inventory: A Manual for Teachers and Trainers* (Boston, Massachusetts: McBer & Company, 1986).

The Learning Style Inventory (LSI) defines four types of learners: the Accomodator, the Diverger, the Converger, and the Assimilator. The typology does not characterize individual learning styles as being fixed, permanent, or genetically invariable, but rather posits that the learning style types represent relatively stable cognitive states—all of which an individual may utilize, although one specific learning style may be used most often.[15] Given below are brief descriptions of the four types of learners.

Accomodators are individuals with a high score in the Concrete-Experiencing (CE) dimension and the Active-Experimenting (AE) dimension. Accomodators learn best from specific examples and rely heavily on experimentation. These individuals grasp information through concrete experience and process it through active experimentation. Favorably indicated areas of study include marketing and sales.

Divergers are individuals with a high score in the Concrete-Experiencing (CE) dimension and the Reflective-Observational (RO) dimension. Divergers learn best from specific examples and tend to reflect upon new information. These individuals grasp information through concrete experience and transform it through reflective observation. Favorably indicated areas of study include the humanities and the liberal arts.

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[15]Leona Tyler has referred to enduring and consistent patterns of cognitive transaction between the individual and his or her environment, such as the learning style "types" posited by Kolb, as "possibility processing structures." See Tyler's *Individuality* (San Francisco: Jossey-Bass, 1978).

Convergers are individuals with a high score in the Abstract Conceptualizing (AC) dimension and the Active-Experimenting (AE) dimension. Convergers learn best in an environment that emphasizes systematic analysis and rely heavily on experimentation. These individuals grasp information through abstract conceptualization and process it through active experimentation. Favorably indicated areas of study include technology and engineering.

Assimilators are individuals with a high score in the Abstract-Conceptualizing (AC) dimension and the Reflective-Observational (RO) dimension. Assimilators learn best in an environment that emphasizes systematic analysis and tend to reflect upon new information. These individuals grasp information through abstract conceptualization and transform it through reflective observation. Favorably indicated areas of study include science and mathematics.

Kolb's typology provides a model for the evaluation of music theory instructional material in terms of individual learning styles. An instructor may employ Kolb's typology during the process of developing instructional material, so that each of Kolb's learning style "types" will benefit from appropriately adapted instruction. The current project attempts to evaluate the effectiveness of a specific methodology for the development of music theory instructional material in terms of Kolb's experiential learning theory and Kolb's individual learning style typology.

CHAPTER III

ADAPTATION OF INSTRUCTIONAL MATERIAL FOR

KOLB'S LEARNING STYLE TYPOLOGY

Educational theorists have developed methods for the adaptation of instructional material to the learning styles of individual students. The process of matching instructional design to the needs of individual learners involves the creation of instructional material, the development of teaching strategies, and the organization of the structure and environment in which learning occurs. Since the 1980s, when learning styles theory began to achieve a high level of prominence, various areas of educational planning and development have reflected the influence of research into learning styles.

Rita Dunn has written extensively on the process of adapting instructional material to match the specific learning styles of individual students. Dunn provides techniques for the adaptation of instructional material to the learning modalities identified by various theoretical paradigms. In Dunn's methodology, instructional material is altered to match the cognitive tendencies described by an existing theoretical model, with independent adaptations being created for each style of learning. To implement Dunn's system in an instructional environment, the learning styles of each student in a class must

first be assessed, and the teacher must then adapt material for the learning styles represented by the students.[1]

The "4MAT" system, developed by B. McCarthy, is a widely used system for the implementation of learning styles strategies into elementary school curricula. McCarthy's system provides inventories for assessing the learning styles of individual students, and methods for adapting instructional material for individual learners. The "4MAT" system requires classroom instructors to adapt instructional material for the specific individuals present in an instructional environment.[2]

"Problem centered learning" is a term used to describe learning styles strategies in math and science curricula. Stephanie Kadel has developed a system for adapting math and science instructional material for individual student learning styles, in accordance with the concept of "problem centered learning." Kadel has also developed an inventory for assessing the learning styles of individual students.[3]

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[1]Rita Dunn describes her procedures for adapting instructional material to the learning styles of individual students in *Teaching Students Through Their Individual Learning Styles: A Practical Approach* (Reston, Virginia: Reston Publishing Company, 1978). Also see Rita Dunn's *How to Implement and Supervise a Learning Style Program* (Alexandria, Virginia: Association for Supervision and Curriculum Development, 1996). ED 395367.

[2]See B. McCarthy's *The 4Mat System: Teaching Learning Styles with Right/Left Mode Techniques* (Barrington, Illinois: Excel Inc., 1985).

[3]Stephanie Kadel provides her assessment inventory, a list of resources, and instructional materials for learning styles curricula in the areas of math and science instruction in *Problem-Centered Learning in Mathematics and Science* (Washington, D.C.: Office of Educational Research and Improvement, 1992). ED 342681.

The National Association of Secondary School Principals (NASSP) has urged the adoption of instructional strategies based on learning styles theory. Rita Dunn assisted with the effort to develop the NASSP recommendations, and Dunn's methodology is reflected in the guidelines issued by the association. The NASSP recommendations include the identification of the specific learning style of individual students and the adaptation of instructional material and instructional strategies to match the individual's specific learning style, especially adaptation implemented by the classroom instructor.[4]

Many of the existing methodologies for adapting instructional material to the learning styles of individual students require the learning styles of each student in a class first to be assessed, and instructional material then to be adapted for the specific individual learners present in the instructional environment. The process of adapting instructional material directly for individual learners is associated with the concept of "individualized instruction." Dunn's methodology includes elements of the

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[4]In 1989 the NASSP recognized the following secondary schools for their adoption of curricula based on principles of learning styles theory: Corsicana High School- Corsicana, Texas; Midwest High School- Midwest, Wyoming; Sacred Heart Academy- Hempstead, New York; Robeson High School- Chicago, Illinois; and Cedar Crest High School- Lebanon Pennsylvania. The report of the NASSP is found in "Learning Styles: Key to Improving Schools and Student Achievement," *Curriculum Report* XVIII 1989). Rita Dunn is one of the authors of the report.

"individualized instruction" approach to the development of instructional material.[5] In the current study, Dunn's methodology is extended by simultaneously adapting a single instructional sequence for all of the learning styles described in a theoretical model. As in Dunn's methodology, the specific needs of each learning style are individually addressed during the development of the instructional material.

Instructors can adapt material for the specific learning styles described in Kolb's typology. Given below are examples provided by Rita Dunn of instructional procedures adapted for each of Kolb's four learning style types. The adaptations were designed for a school counselor education class.[6]

Accomodators (who grasp information through concrete experience and process it through active experimentation) were required to interview a currently practicing counselor and to write a paper recommending ways that schools or agencies could serve more effectively.

Divergers (who grasp information through concrete experience and transform it through reflective observation) were required to interview a currently practicing counselor and to then engage in reflective observation through class discussion.

Convergers (who grasp information through abstract conceptualization and transform it through active experimentation) were required to formulate questions that

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[5]Rita Dunn provides a description of "individualized instruction" in *Teaching Students Through Their Individual Learning Styles: A Practical Approach*.

[6]See Rita Dunn's *How to Implement and Supervise a Learning Style Program*.

they would like to ask a currently practicing counselor and to write a paper recommending ways that schools or agencies could serve more effectively.

Assimilators (who grasp information through abstract conceptualization and transform it through reflective observation) were required to formulate questions that they would like to ask a practicing counselor and to then engage in reflective observation through class discussion.

Kolb's typology of learning styles can serve as a model to evaluate the ability of music theory instructional material to match the learning styles of individual students. Since music analysis requires abstract conceptualization, learners who require concrete experiencing should be given an opportunity to see more examples of new concepts in which a number of variables remain constant (such as chord inversion or musical texture) before progressing to more varied examples. Since completing analytical exercises is a process of active experimentation, learners who require reflective observation should be given an opportunity to internalize new concepts. An adaptation which allows reflective observation could perhaps be a process of class discussion and review of student compositions, which would then be revised and analyzed. Composition may seem to be an active experimenting process, but creating new music requires an internalization or reflection upon new analytical concepts, consistent with the learning style modality of reflective observation.

Given below are examples of music theory instructional procedures adapted for each of Kolb's four learning style types. The learning objective is the ability to analyze secondary dominant sonorities, the student is assumed to have previously gained the

skills required to analyze diatonic common practice musical texture in terms of "roman numeral" analytical notation. The concept of sonorities with secondary dominant function can be introduced for all four learning style types using both the concrete examples presented in Figure 3 and the abstract description presented in Figure 4.[7]

Individuals with the accommodator learning style grasp information through concrete experience and process it through active experimentation. The concept of secondary dominant function may be introduced with the use of both Figures 3 and 4, but the concrete examples presented in Figure 3 should be emphasized. Figure 5 may serve as a further example of secondary dominant function, since the sonorities are presented in chorale texture and mostly in root position.[8] To facilitate active experimentation, students should be asked to analyze the secondary dominant sonorities found in an example exercise, such as Figure 5, and then asked to complete an analytical assignment, such as Figure 6. Students should complete the assignment without assistance, but after the exercise is accomplished, an instructor should check the students' work and explain the analysis of each of the secondary dominant sonorities. These activities allow students an opportunity to grasp the concept of secondary dominant function through the modality

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[7]Figure 4 is an altered version of a procedure for recognizing secondary dominants found in Stefan Kostka and Dorothy Payne, *Tonal Harmony*, 1st ed. (New York: Alfred A. Knopf, 1984), 245.

[8]J. S. Bach, Chorale No. 102, as given in Albert Riemenschneider's *371 Harmonized Chorales and 69 Chorale Melodies with Figured Bass by Johann Sebastian Bach*. New York: G. Schirmer, 1941.

Figure 3. Concrete Examples of Secondary Dominant Function
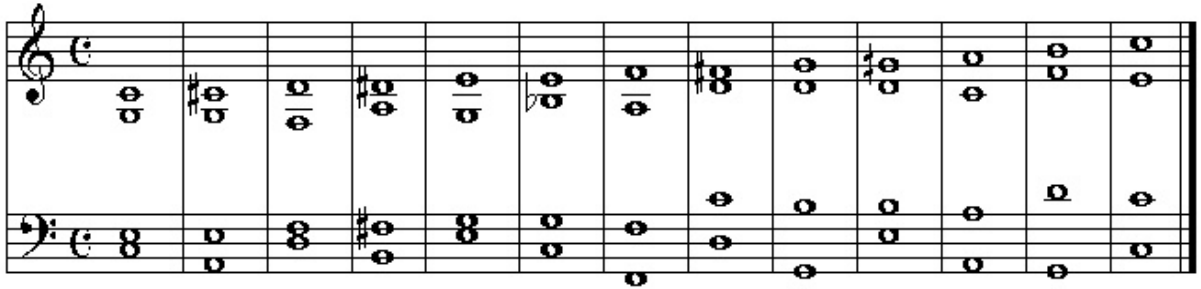
C: I   V⁷/ii   ii   V⁷/iii   iii   V⁷/IV   IV   V⁷/V   V   V⁷/vi   vi   V⁷   I

Figure 4. Abstract Description of Secondary Dominant Function

If the answer is "yes" to all of the questions in group 1 or group 2, then a particular sonority has a secondary dominant function.

Group 1	Group 2
Is the sonority chromatically altered from the key signature?	Is the sonority chromatically altered from the key signature?
Is the sonority a major triad or a major-minor seventh chord?	Is the sonority a diminished triad, a fully-diminished seventh chord, or a half-diminished seventh chord?
Is the pitch a perfect fifth below the root of the altered chord a member of the diatonic scale?	Is the pitch a half step above the root of the altered chord a member of the diatonic scale?
Is the pitch a perfect fifth below the root of the altered chord a pitch on which one could build a diatonic major or minor triad?	Is the pitch a half step above the root of the altered chord a pitch on which one could build a diatonic major or minor triad?

Figure 5. Further Example for the Modality of Concrete Experience

Figure 6. Analytical Exercise for the Modality of Active Experimentation

Directions: Complete the soprano, alto, and tenor voice parts in chorale texture.

C: I V⁶ I V/vi   vi V⁶ I V/ii   ii V⁶₅/iii iii V⁷/IV IV V⁶₅/v I⁶₄ V⁷   I

of concrete experience, and to transform the concept through the modality of active experimentation.

Individuals with the diverger learning style grasp information through concrete experience and process it through reflective observation. The concept of secondary dominant function may be introduced with the use of both Figures 3 and 4, but the abstract "rules" presented in Figure 4 should be emphasized. Figure 3 may serve as a further example of secondary dominant function, since the sonorities are presented in chorale texture and mostly in root position. To facilitate reflective observation, Figure 5 should be demonstrated through an instructor guided application of the rules from Figure 4 to the specific sonorities encountered in Figure 5. Students should be asked to complete a brief composition project, such as the one presented in Figure 7, and the student compositions should then be compared and analyzed through group discussion. These activities allow students an opportunity to grasp the concept of secondary dominant function through the modality of concrete experience, and to transform the concept through the modality of reflective observation.

Individuals with the converger learning style grasp information through abstract conceptualization and process it through active experimentation. The concept of secondary dominant function may be introduced with the use of both Figures 3 and 4, but the concrete examples presented in Figure 3 should be emphasized. Figure 8, which presents secondary dominant sonorities in a variety of inversions, may be used as a

Figure 7. Analytical Exercise for the Modality of Reflective Observation

Directions: Compose the bass line and accompanying material in any musical texture.

Figure 8. Further Example for the Modality of Abstract Conceptualization

further example.[9] Other examples may be used which present secondary dominant sonorities in different musical textures (such as piano texture or ensemble texture). To facilitate active experimentation, students should be asked to analyze the secondary dominant sonorities found in an example musical passage, such as Figure 8, and then asked to complete an analytical assignment, such as Figure 6. Students should complete the assignment without assistance, but after the exercise is accomplished, an instructor should check the students' work and explain the analysis of each of the secondary dominant sonorities. These activities allow students an opportunity to grasp the concept of secondary dominant function through the modality of abstract conceptualization, and to transform the concept through the modality of active experimentation.

Individuals with the assimilator learning style grasp information through abstract conceptualization and process it through reflective observation. The concept of secondary dominant function may be introduced with the use of both Figures 3 and 4, but the abstract "rules" presented in Figure 4 should be emphasized. Figure 8, which presents secondary dominant sonorities in a variety of inversions, may be used as a further example. Other examples may be used which present secondary dominant sonorities in different musical textures (such as piano texture or ensemble texture). To facilitate reflective observation, Figure 8 should be demonstrated through an instructor guided application of the rules from Figure 4 to the specific sonorities encountered in Figure 8. Students should be asked to complete a brief composition project, such as the one

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[9]J. S. Bach, Well-Tempered Clavier Book II Fugue No. 6 in D Minor, mm.10-14.

presented in Figure 7, and the students' compositions should then be compared and analyzed through group discussion. These activities allow students an opportunity to grasp the concept of secondary dominant function through the modality of abstract conceptualization, and to transform the concept through the modality of reflective observation.

In the preceding examples of music theory instructional procedures adapted for Kolb's learning style types, each type of learner received a separate adaptation, as demonstrated in Dunn's examples adapted for the school counselor education class. In the current study, music theory instructional material is simultaneously adapted for all four of Kolb's learning style types. This research project studies the potential learning outcomes produced by music theory instructional material adapted for the needs of all of Kolb's learning style "types" compared to material adapted for a limited number of learning modalities.

The current study provides a specific methodology for the adaptation of music theory instructional material to the learning styles described in Kolb's typology. As in Rita Dunn's methodology, the needs of each type of learner are specifically addressed during the process of creating instructional material. The current study, however, presents a method for adapting instructional material simultaneously for all four of Kolb's learning style types.

Adapting instructional material for the learning styles described in a specific theoretical model requires the author of the adaptation to analyze the requirements of individual learners in terms of the chosen theoretical paradigm. For example, if the

paradigm of tactile vs. kinesthetic learners is adopted, then the author of the adaptation must specifically adapt material for the needs of both tactile and kinesthetic learners as they are described in the theoretical model. Rita Dunn's example adaptations for a school counselor education class, based on Kolb's typology, demonstrates a collection of instructional procedures specifically adapted for each of Kolb's learning style types.[10] In Dunn's examples, Kolb's axes of concrete experience vs. abstract conceptualization and active experimentation vs. reflective observation are represent by distinct learning activities; as a result, four specific instructional procedures, a distinct instructional procedure for each of Kolb's learning style types, are created. The current methodology integrates the processes of creating separate adaptations for each specific learning style type into a single procedure for the development of comprehensive and effective instructional material.

Given below is the methodology for the adaptation of music theory instructional material to the individual learning styles described in Kolb's typology.

1. Identification of a specific learning objective.

2. Analysis of the learning objective in terms of Kolb's axis of apprehension (concrete experience vs. abstract conceptualization.)

3. Creation of an instructional strategy specifically targeted for the concrete experience element of the apprehension axis.

4. Creation of an instructional strategy specifically targeted for the abstract conceptualization element of the apprehension axis.

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[10]See Rita Dunn's *How to Implement and Supervise a Learning Style Program*.

5. Analysis of the learning objective in terms of Kolb's axis of transformation (active experimentation vs. reflective observation.)

6. Creation of an instructional strategy specifically targeted for the active experimentation element of the transformation axis.

7. Creation of an instructional strategy specifically targeted for the reflective observation element of the transformation axis.

8. Creation of instructional material that includes the essential elements produced from procedures 3, 4, 6, and 7 of the current methodology.

As an example of the process outlined by the methodology, let us apply the eight procedures detailed above to the learning objective of the previous adaptations for music theory instructional material to Kolb's learning style types.

1. Identification of a specific learning objective.

    The learner will be able to provide "roman numeral" analysis of secondary dominant sonorities.

2. Analysis of the learning objective in terms of Kolb's axis of apprehension (concrete experience vs. abstract conceptualization.)

    The concept of secondary dominant function relates most closely with the learning modality of abstract conceptualization Adaptation for the modality of concrete experience can be supplied by providing the learner with specific examples of secondary dominant sonorities.

3. Creation of an instructional strategy specifically targeted for the concrete experience element of the apprehension axis.

    The learner will be presented with specific examples of secondary dominant sonorities in which a number of variables remain constant (such as chord inversion or musical texture).

4.   Creation of an instructional strategy specifically targeted for the abstract conceptualization element of the apprehension axis.

The learner will be presented with an abstract description of the concept of secondary dominant function (such as figure 2).

5.   Analysis of the learning objective in terms of Kolb's axis of transformation (active experimentation vs. reflective observation.)

The concept of secondary dominant function can be transformed either by experimentation or reflection.

6.   Creation of an instructional strategy specifically targeted for the active experimentation element of the transformation axis.

The learner will complete an analytical exercise (such as figure 4).

7.   Creation of an instructional strategy specifically targeted for the reflective observation element of the transformation axis.

The learner will compose an original composition that includes secondary dominant sonorities. The student's composition will be compared and analyzed through group discussion.

8.   Creation of instructional material that includes the essential elements produced from procedures 3, 4, 6, and 7.

The instructional text will combine all of the strategies described in procedures 3, 4, 6, and 7.

The methodology provides a process for the creation of music theory instructional material that is simultaneously adapted for all four of Kolb's learning style types. The methodology allows the needs of each of Kolb's four types of learners to be specifically addressed during the development of the instructional material. The current study proposes an analysis of the potential learning outcomes produced by music theory instructional material adapted for the needs of all of Kolb's learning style "types" compared to material adapted for a limited number of learning modalities.

CHAPTER IV

COMPUTER-BASED INSTRUCTION FOR MUSIC THEORY

Computer based instruction (CBI) can be an effective and convenient method for the presentation of music theory instructional material. When using computer based instruction students receive instruction at their own pace, may repeat material as many times as necessary, and are able to schedule the time at which they receive instruction. Computer based instruction also allows students who are not able to attend college or university classes an opportunity to study specialized fields of learning, such as music theory.

An important medium of computer based instruction is software created to assist classroom instructors or to be integrated with the curriculum of specific college or secondary courses, these software packages are referred to as "educational software" or "courseware." The categories of educational software programs include drill and practice software, tutorial software, simulation software, instructional games, and multi-media resource material. Commercial software developers have created instructional programs for music and music theory, including drill and practice software for music theory and

aural skills, drill and practice software for keyboard skills, and CD ROM based resource materials for the study of music literature.[1]

For the proposed study, two computer based music theory instructional sequences have been created, one of which is adapted for the needs of all four of Kolb's learning style types, while the other sequence is adapted for a limited number of learning style modalities.[2] Random chance will determine which of the two instructional sequences are presented to individual research participants. Research participants will record pre-test responses before beginning an instructional sequence, and post-test responses after the completion of an instructional sequence. The proposed study will evaluate the difference in learning outcomes produced by the two computer based instructional sequences.

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[1]Drill and practice software for aural skills includes *Basic Ear Training Skills*, written by Paul E Dworak and Robert W. Ottman and published by Prentice-Hall, *Music Lessons*, written by Todd Walker and John Ellinger and published by MiBac Software, *MacGamut*, designed and produced by Ann K. Blombach and published by MacGamut Music Software, and *Listen*, published by Imaja, drill and practice software for keyboard skills includes *Piano Works*, published by Temporal Acuity, and multi-media resource material for music literature include *Composer Quest*, published by Compton's New Media, and *Musical Instruments*, published by Microsoft. In 1996 the Journal of Music Theory Pedagogy reviewed instructional software programs for music theory created for the HyperCard format and CD ROM based resource material for music literature, see *Journal of Music Theory Pedagogy* vol. X.

[2]During the active period of the current study, research participants accessed the instructional sequences through a web domain registered specifically for the purpose of the study, the url was http://www.crkweb.org. The instructional sequences can currently be found on the world wide web at http://www.pages.prodigy.net/michaellively, but the web-based forms are no longer active.

Following is a brief description of the two instructional sequences created for the proposed study. Research participants will access the instructional sequences through the world wide web with standard internet web browsers and record their responses by submitting web-based forms as prompted by the instructional sequences. The following description of the individual "screens" from the instructional sequences will refer to the pagination given in Appendices A and B.

Instructional Sequence #1 (See Appendix A)

page 64   Title screen.

page 65   Introduction.

               The text of the introduction page reads as follows: "The
               objective of this research project is to evaluate the
               effectiveness of various methods of presenting music
               theory instruction. You will first be asked to complete a
               short pre-test. After you finish the pre-test you will be
               asked to read a brief instructional text which explains the
               concept of 'closely related keys' and you will be asked to
               answer the example questions which are contained within
               the instructional text. Finally, you will be asked to
               complete a short post-test. Your scores on the pre-test and
               the post-test will be compared to the scores of other
               participants in order to evaluate the effectiveness of
               different methods of presenting music theory instruction.
               Your participation is greatly appreciated."

page 66   Information form.

                 This page is a web-based form that provides personal
                 information about individual research participants. The data
                 collected from this page include the participant's name or
                 number, current university affiliation, age, gender, most
                 recently completed educational degree, current major field,
                 number of completed semesters of music theory instruction,
                 whether or not music theory was studied in connection with
                 individual piano instruction, and whether or not music
                 theory was studied as part of high school course work.

page 67   Random text selection.

                 This screen provides a button which randomly directs
                 research participants to either Instructional Sequence #1 or
                 Instructional Sequence #2.

pages 68-70   Pre-Test for Instructional Sequence #1.

                 This page is a web-based form consisting of music theory
                 questions on the subject of closely related keys.

pages 71-72   Instructional Text #1

                 This is the primary information screen for Instructional
                 Sequence #1. Instructional Text #1 requires research
                 participants to apprehend information using mainly the
                 learning modality of abstract conceptualization.
                 See appendix A for the complete text.

pages 73-84   Practice questions for Instructional Sequence #1

                 These questions require research participants to transform
                 the information from Instructional Text #1 using mainly the
                 learning modality of reflective observation.

page 85   "Thank You" screen at the conclusion of the practice
                 questions.

pages 86-88   Post-Test for Instructional Sequence #1.

These are the same questions that research participants were asked in the Pre-Test for Instructional Sequence #1. A comparison of Pre-Test vs. Post-Test scores for Instructional Sequence #1 reveals the nature of the "learning outcome" produced by Instructional Sequence #1.

page 89   "Thank You" screen at the conclusion of Instructional Sequence #1.

Instructional Sequence #2 (See Appendix B)

page 91   Title screen.

page 92   Introduction.

Same as for Instructional Sequence #1

page 93   Information form.

Same as for Instructional Sequence #1

page 94   Random text selection.

Same as for Instructional Sequence #1

pages 95-97   Pre-Test for Instructional Sequence #2.

This page is a web-based form consisting of music theory questions on the subject of closely related keys.
The Pre-Test for Instructional Sequence #2 is the same as the Pre-Test for Instructional Sequence #1.

pages 98-107 Instructional Text #2

This is the primary information screen for Instructional Sequence #2. Instructional Text #2 allows research participants to apprehend information using both the learning modalities of abstract conceptualization concrete experience. See appendix A for the complete text.

pages 108-42   Practice questions for Instructional Sequence #2

These questions allow research participants to transform the information from Instructional Text #2 using both the learning modalities of reflective observation and active experimentation.

pages 143   "Thank You" screen at the conclusion of the practice questions.

page 144-46   Post-Test for Instructional Sequence #2.

These are the same questions that research participants were asked in the Pre-Test for Instructional Sequence #2. A comparison of Pre-Test vs. Post-Test scores for Instructional Sequence #2 reveals the nature of the "learning outcome" produced by Instructional Sequence #2. A comparison of the "learning outcomes" produced from each the two instructional sequence determines the relative effectiveness of the individual sequences.

page 147   "Thank You" screen at the conclusion of Instructional Sequence #2.

The proposed study will evaluate the difference in potential learning outcomes produced by the two computer based instructional sequences. A comparison of the pre-test vs. post-test scores form each of the instructional sequences will reveal the "learning outcome" produced by the individual sequence. A comparison of the "learning outcomes" produced from each the two instructional sequence will determine the relative effectiveness of the individual sequences.

A variety of methods for evaluation can determine the quality of instructional software or computer-based instructional sequences. In the proposed study, the primary method of evaluation will be the assessment of learning outcomes, as determined by the comparison of pre-test vs. post-test scores for each of the study's two instructional

sequences. An evaluation of learning outcomes assesses the effectiveness of instructional software or an instructional sequence; however, other methods of evaluation determine aspects of software quality, such as usability, technical reliability, and the appropriateness of content material.

Educational theorists have developed a number of guidelines and checklists for the evaluation of instructional software.[3] Merrill et al. have suggested a method for software evaluation that considers aspects such as screen format, navigation, ease of use, and interaction. See Figure 9 for an example of the evaluation procedure developed by Merril et al.[4] Lockard, Abrams, and Many have created a method for software evaluation that assesses compatibility, content, technical capabilities, and usability. See Figure 10 for an example of the evaluation procedure developed by Lockard, Abrams, and Many.[5] The instructional sequences created for the current study reflect the principles suggested in these guidelines.

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[3]Methods for the evaluation of instructional software are discussed in M. D. Roblyer, Jack Edwards, and Mary Anne Havriluk, *Integrating Educational Technology Into Teaching* (Upper Saddle River, New Jersey: Merrill, 1997), 116-23. See also B. Gill, W. Dick, R. Reiser, and J. Zahner, "A New Model for Evaluating Instructional Software," *Educational Technology* XXXII no. 3 (1992): 39-48.

[4]See Paul F. Merrill, Kathy Hammons, Bret R. Vincent, Peter L. Reynolds, Larry Christensen, and Marvin N. Tolman, *Computers in Education* 3rd ed. (Boston: Allyn and Bacon, 1996), 109-19. The checklist for software evaluation provided in Figure 1. is taken from the discussion of software evaluation in Merrill et al.

[5]See James Lockard, Peter D. Abrams, and Wesley A. Many, *Microcomputers for Educators* 2nd ed. (Glenview, Illinois: Scott, Foresman and Company, 1990), 201-29. The guidelines for software evaluation in provided in Figure 2. are taken from the discussion of software evaluation in Lockard, Abrams, and Many.

Evaluation of instructional software in terms of aspects such as usability, technical reliability, and the appropriateness of content material may serve as a method to determine the quality of instructional software. In the current study, an awareness of the required elements for quality software design guided the development of the instructional sequences. The primary method of evaluation for the current study; however, is the relative effectiveness of the two instructional sequences, in terms of potential learning outcomes.

Table 1.

Checklist for the Evaluation of Instructional Software
(Adapted from Merrill et al.)

Screen Format

_____ Blank space is used liberally.

_____ A busy, cluttered screen is avoided.

_____ Cryptic abbreviations and codes are minimal.

_____ The screen elements take advantage of natural eye movement.

_____ Correct spelling and grammar are used.

_____ Flashing text and other forms of highlighting are used sparingly.

Navigation

_____ Scrolling is avoided when accessing new material.

_____ A visual effect or slight pause is used when erasing and redisplaying the same
             section of the screen.

_____ The student does not have to attend to two different things on the screen
             simultaneously.

_____ Student responses are required before proceeding to a new screen; time-out
             displays are avoided.

_____ The student may proceed forward and backward through the instruction.

Ease of Use

_____ Menus and/or special commands enable the student to go easily from one part of
             the program to another.

_____ Keys used to implement a command are mnemonically related to the purpose of
             the command.

Table 1 (Continued)

_____ All possible alternative commands are made clear.

_____ A minimum of keystrokes is required to execute any command.

_____ Keys used to execute commands are consistent throughout the program.

_____ Instructions are clear, simple, and concise.

_____ Instructions are available both on-line and off-line.

_____ The student has the option to skip lengthy instructions.

_____ The student is prompted what to do next at critical points in the program.

_____ Minimum time is required to generate title page.

_____ Messages are provided to inform the student of noticeable pauses in a program.

_____ Pauses are masked where possible.

Interaction

_____ Interactive capabilities of the computer have been well used.

_____ The student is prompted on the nature of the expected response.

_____ The student is allowed to correct typing mistakes by requiring the pressing of the
ENTER key to signal the end of a response.

_____ Error traps test the appropriateness of the student's response.

_____ Correct feedback is provided when the student enters an incorrect answer to
questions or problems.

_____ Sarcastic feedback is avoided.

_____ The number of times the student iterates through try-again loops is minimized.

Table 2

Guidelines for the Evaluation of Instructional Software
(Adapted from Lockhard, Abrams, and Many)

Compatibility

For what computer brands is the software available, such as PC or Macintosh?

What hardware is required, such as memory or disk drives?

What operating system is required?

Content

Is the content accurate?

Is the instructional strategy sound?

Is the material free of violent or aggressive behavior and all bias, including gender
and race?

Are the objectives clearly stated?

Are the objectives important components of the curriculum?

Is the readability level appropriate for the intended audience?

Is the material free from grammatical errors, typos, and misspellings?

Are instructions clear and correct?

Is the overall difficulty level appropriate?

Will the material help to motivate the learners?

Does the package appear to offer good value for the price.

Table 2 (Continued)

Technical Capability

Does the package take advantage of the capabilities of the computer?

Is the program likely to "crash?"

Can the student exit the program?

Is there provision for use of alternative input devices?

Usability

Does the learner control the pace and/or sequence of the presentation?

Do responses require more than minimal typing?

Is feedback to responses appropriate?

Is feedback effective?

Are graphics, if used, supportive of the learning process?

If sound is used, does it serve a useful purpose?

Can the package be used with little or no help from the teacher?

CHAPTER V

EVALUATION OF COMPUTER BASED INSTRUCTION FOR MUSIC THEORY

The current study compares the differences in learning outcomes produced by two computer based instructional sequences, one of which emphasizes all of the learning style modalities described in D. A. Kolb's theory of experiential learning, while the other instructional sequence emphasizes only some of Kolb's learning style modalities. When the instructional sequences are presented to a group of students who possess the full range of individual learning styles, the instructional sequence which emphasizes all of the possible learning style modalities may be expected to produce superior results, in terms of group learning outcome, than the instructional sequence that emphasizes only some of Kolb's learning style modalities. For example, if an instructional sequence emphasizes the learning modality of abstraction, students whose preferred learning style utilizes abstraction will find the instruction to be effective, but other students will find the instruction to be ineffective. If an instructional sequence emphasizes a variety of learning style modalities, however, such as abstraction, experimentation, reflection, and concrete experience, then a larger number of students will find the instruction to be effective. The current study suggests that Kolb's experiential learning theory and typology of individual learning styles may guide the development of music theory instructional material by providing a model for the variety of individual learning styles. Authors of music theory instructional material are then able to achieve the most effective group learning outcome

42

adapting instructional material to meet the needs of each of the individual learning styles described in Kolb's typology.

The development of the two contrasting instructional sequences to be compared in the current study follow the specific methodology described in Chapter III. The methodology requires the author of instructional material to identify a specific learning objective and to then create effective learning activities for each of the possible extremes of Kolb's two axes of learning modalities (concrete experience-abstraction and experimentation-reflection). As a result, the methodology produces four distinct strategies for the learning objective. Since the individual learning styles described in Kolb's typology represent combinations of the four learning style modalities, instructional material adapted for all of the possible learning modalities will also be adapted for all of the possible learning style types. The development of the instructional sequence in the current study that was intended not to represent all of Kolb's learning modalities follows the same methodology, but does not include the full range of instructional strategies, and therefore is adapted for some, but not all, of Kolb's learning style types.

The specific methodology for the adaptation of instructional material to the learning style types described in Kolb's typology guided the development of Instructional Sequence #1, adapted for only the learning modalities of abstract conceptualization and reflective observation, and Instructional Sequence #2, adapted for all of Kolb's learning style modalities. Given below is a description of the process of development for the two

instructional sequences, in terms of the individual procedures required by the methodology.[1]

Application of the Specific Methodology for Instructional Sequence #1

1. Identification of a specific learning objective.

    The learner will be able to distinguish between different types of tonal key relationships and will be able to label the relationship of two keys as "closely related," "related by modal mixture," or "not closely related."

2. Analysis of the learning objective in terms of Kolb's axis of apprehension (concrete experience vs. abstract conceptualization.)

    The concept of "closely related keys" applies most directly to the learning modality of abstract conceptualization. Since Instructional Sequence #1 is adapted for only the learning modality of abstract conceptualization, the learner will be presented with only abstract descriptions of the different types of key relationships.

3. Creation of an instructional strategy specifically targeted for the concrete experience element of the apprehension axis.

    Instructional Sequence #1 is not adapted for the concrete experience element of the axis of apprehension, therefore, no instructional strategy targeted for the learning modality of concrete experience will be provided.

4. Creation of an instructional strategy specifically targeted for the abstract conceptualization element of the apprehension axis.

    The learner will be presented with an abstract description of the different types of key relationships. The learner will be provided with a procedure for deriving each type of key relationship from a chosen key.

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[1]A detailed explanation of the methodology is provided in Chapter III, pp. 28-31.

5. Analysis of the learning objective in terms of Kolb's axis of transformation (active experimentation vs. reflective observation.)

    The learning objective can be effectively transformed through either the learning modality of active experimentation or the learning modality of reflective observation. For the modality of reflective observation, the learner will be provided with "open-ended" and abstract questions related to the learning objective. Since Instructional Sequence #1 is adapted for only the reflective observation element of the axis of transformation, the learner will be presented with only "open-ended" and abstract questions.

6. Creation of an instructional strategy specifically targeted for the active experimentation element of the transformation axis.

    Instructional Sequence #1 is not adapted for the active experimentation element of the axis of transformation, therefore, no instructional strategy targeted for the learning modality of active experimentation will be provided.

7. Creation of an instructional strategy specifically targeted for the reflective observation element of the transformation axis.

    The learner will be provided with "open-ended" and abstract questions related to the learning objective. The questions will require the learner to transform information previously presented and will have multiple responses which are potentially correct. Correct responses will be provided after the learner has been given an opportunity to reflect upon the concepts suggested by the "open-ended" questions.

8. Creation of instructional material that includes the essential elements produced from procedures 3, 4, 6, and 7.

    Since Instructional Sequence #1 is exclusively adapted for only the learning modalities of abstract conceptualization and reflective observation, the essential elements from only procedures 4 and 7 are provided.

Application of the Specific Methodology for Instructional Sequence #2

1.   Identification of a specific learning objective.

      The learner will be able to distinguish between different types of tonal key relationships and will be able to label the relationship of two keys as "closely related," "related by modal mixture," or "not closely related." (The learning objective of Instructional Sequence #1 and Instructional Sequence #2 are the same).

2.   Analysis of the learning objective in terms of Kolb's axis of apprehension (concrete experience vs. abstract conceptualization.)

      The concept of "closely related keys" applies most directly to the learning modality of abstract conceptualization. Adaptation for the learning modality of concrete experience can be supplied by providing the learner with specific examples of the various types of key relationships.

3.   Creation of an instructional strategy specifically targeted for the concrete experience element of the apprehension axis.

      The learner will be presented with many specific examples of the different types of key relationships. For the most important types of key relationships, "closely related keys," and "keys related by modal mixture," the learner will be provided with a complete set of examples, showing all of the keys with a specific relation to a given primary "home" key. For example, if C major is the chosen "home" key, the student will be given all of the keys "closely related" to C major as an example of the concept of "closely related keys." The examples will include a text description, a graphic representation of the key signatures, and the complete notation of the scales associated with each key.

4.   Creation of an instructional strategy specifically targeted for the abstract conceptualization element of the apprehension axis.

      The learner will be presented with an abstract description of the different types of key relationships. The learner will be provided with a procedure for deriving each type of key relationship from a chosen key.

5. Analysis of the learning objective in terms of Kolb's axis of transformation (active experimentation vs. reflective observation.)

The learning objective can be effectively transformed through either the learning modality of active experimentation or the learning modality of reflective observation. For the modality of active experimentation, the learner will be presented with a computer-based drill and practice exercise. For the modality of reflective observation, the learner will be provided with "open-ended" and abstract questions related to the learning objective.

6. Creation of an instructional strategy specifically targeted for the active experimentation element of the transformation axis.

The learner will be presented with a computer-based drill and practice exercise. The exercise will include specific questions related to the learning objective and will provide rapid and frequent "feed-back" responses.

7. Creation of an instructional strategy specifically targeted for the reflective observation element of the transformation axis.

The learner will be provided with "open-ended" and abstract questions related to the learning objective. The questions will require the learner to transform information previously presented and will have multiple responses which are potentially correct. Correct responses will be provided after the learner has been given an opportunity to reflect upon the concepts suggested by the "open-ended" questions.

8. Creation of instructional material that includes the essential elements produced from procedures 3, 4, 6, and 7.

Instructional Sequence #2 will present new material with the instructional strategies developed for both elements of the axis of apprehension, concrete experiencing as developed in procedure 3, and abstract conceptualization as developed in procedure 4. Instructional sequence #2 will also provide an opportunity for the learner to transform new information with the instructional strategies developed for both elements of the axis of transformation, active experimentation as developed in procedure 6, and reflective observation as developed in procedure 7.

The methodology provides a procedure for the adaptation of instructional material to the specific needs of Kolb's individual learning style modalities. With the given learning objective, "the learner will be able to distinguish between different types of tonal key relationships and will be able to label the relationship of two keys as 'closely related,' 'related by modal mixture,' or 'not closely related,' " procedure 2 of the methodology, analysis of the learning objective in terms of Kolb's axis of apprehension, results in a conclusion that the concept of "closely related keys" applies most directly to the learning modality of abstract conceptualization, but that adaptation for the learning modality of concrete experience can be supplied by providing the learner with specific examples of the various types of key relationships. As a result of Procedure 5, analysis of the learning objective in terms of Kolb's axis of transformation, we discover that the learning objective can be effectively transformed through either the learning modality of active experimentation or the learning modality of reflective observation. Procedure 8, creation of instructional material that includes the essential elements produced by procedures 3, 4, 6, and 7, develops an instructional sequence that is simultaneously adapted for all four of Kolb's learning style types, the material for the instructional text having been created in the previous procedures of the methodology. The current project proposes a study of the differences in learning outcomes produced by an instructional sequence adapted for only two of Kolb's four learning style modalities (Instructional Sequence #1) and an instructional sequence adapted for all of Kolb's learning style modalities (Instructional Sequence #2). The application of the specific methodology to the development of instructional material should follow all of the elements of procedure

8; however, Instructional Sequence #1 provides a counter-example to Instructional Sequence #2, and therefore was developed without the full application of procedure 8. The methodology provides a process for the creation of music theory instructional material that is simultaneously adapted for all four of Kolb's learning style types.

For the current project, two computer based music theory instructional sequences are created, one of which is adapted for the needs of all four of Kolb's learning style types, while the other sequence is adapted for only a limited number of learning style modalities. In the proposed study, random chance will determine which of the two instructional sequences are presented to individual research participants. Research participants will record pre-test responses before beginning an instructional sequence, and post-test responses after the completion of an instructional sequence. The proposed study will evaluate the difference in learning outcomes produced by the two computer based instructional sequences. A comparison of the Pre-Test vs. Post-Test scores form each of the instructional sequences will reflect the "learning outcome" produced by the individual sequences. A comparison of the "learning outcomes" produced from each the two instructional sequences determines the relative effectiveness of each sequence. Results from the evaluation of the two instructional sequences, in terms of "learning outcomes," may be presented in the format suggested by Table 2. Results from the proposed study may also be compared in terms of the relative effectiveness of each instructional sequence for various demographic groups, as shown in Tables 3 and 4.

Table 3

Abbreviations in Tables 4-6

APre=   Average Pre-test Score

 APost=   Average Post-test Score

AI=   Average Improvement from Instructional Sequence #1 to Instructional
               Sequence #2

AIΔ>0   Average Improvement from Instructional Sequence #1 to Instructional
               Sequence #2, Among Participants with an Improvement Greater
               than Zero

#P   Number of Participants

#PAIΔ>0   Number of Participants with an Improvement from Instructional Sequence
               #1 to Instructional Sequence #2, Among Greater than Zero

A<20   Participants with an Age Less than Twenty

A20+   Participants with an Age of Twenty or Above

M   Male Participants

F   Female Participants

IS#1   Instructional Sequence #1

IS#2   Instructional Sequence #2

Table 4

Comparison of the Learning Outcomes Produced by Instructional Sequences #1 and #2

	IS#1	IS#2
#P	0	0
#PAIΔ>0	0	0
APre	0	0
APost	0	0
AI	0	0
AIΔ>0	0	0

Table 5

Comparison of the Learning Outcomes Produced by Instructional Sequences #1 and #2
Among Participants with an Age Less than Twenty and with an Age of Twenty or Above

	A<20 IS#1	A<20 IS#2	A20+ IS#1	A20+ IS#2
#P	0	0	0	0
#PAIΔ>0	0	0	0	0
APre	0	0	0	0
APost	0	0	0	0
AI	0	0	0	0
AIΔ>0	0	0	0	0

Table 6

Comparison of the Learning Outcomes Produced by Instructional Sequences #1 and #2
Among Male and Female Participants

	M IS#1	M IS#2	F IS#1	F IS#2
#P	0	0	0	0
#PAIΔ>0	0	0	0	0
APre	0	0	0	0
APost	0	0	0	0
AI	0	0	0	0
AIΔ>0	0	0	0	0

CHAPTER VI

CONCLUSION

D. A. Kolb's theory of experiential learning provides a model for the process of knowledge acquisition and posits a typology of individual learning styles. Educational research has demonstrated that the quality of subject matter learning is enhanced when instructional design and teaching strategies are matched to the learning styles of individual students, and that the durability of learning improves when instructional methods are adapted for individual learning styles. Many of the most often practiced instructional strategies for music theory tend to favor the learning modalities that Kolb refers to as abstract conceptualization and active experimentation. Learners who primarily utilize the learning modalities that Kolb refers to as concrete experiencing and reflective observation may experience an enhanced opportunity to learn and transform new concepts if instructional material is adapted to these specific individual learning styles.

Kolb's typology of learning styles derives from the relative emphasis an individual places on the different stages of the learning cycle. The tendency for knowledge to be acquired in an abstract versus a concrete cognitive modality (in terms of concrete experiencing compared to abstract conceptualization) is described as a distinct dimension of learning style; and the tendency for knowledge to be transformed in a reflective versus an active cognitive modality (in terms of reflective observation

compared to active experimentation) is described as another distinct dimension of learning style. The four possible combinations of preferred learning modalities creates a typology of four distinct "types" of learners. Kolb does not characterize the individual learning style "types" as being fixed, permanent, or genetically invariable, but rather posits that the learning style "types" represent relatively stable cognitive states, all of which an individual may utilize, although one specific learning style may be used most often. This research project has studied the process of adapting music theory instructional material and has proposed a systematic evaluation of a specific methodology for the creation of music theory instructional material. In the proposed study, computer based instruction (CBI) will deliver instructional sequences to research participants and collect data regarding participants' responses to the instructional sequences.

The proposed study will evaluate the effectiveness of music theory instructional material in terms of Kolb's experiential learning theory and typology of individual learning styles. The computer based instructional sequences, created for this project, will be tested and the pre-test/post-test scores of the participants will be analyzed to determined the varieties of "learning outcomes" produced from the instructional sequences. The instructional material within the different computer based sequences describe the same music theory concepts, but each sequence is targeted for different elements of Kolb's learning style typology. Since the instructional strategies are derived from Kolb's typology, the learning outcomes can be examined in terms of the principles of Kolb's theory of experiential learning. Further research into the questions raised by the current project and the proposed study include an investigation of methods for more

specifically targeting music theory instruction to Kolb's individual learning style types, a more extensive study of individual responses to contrasting varieties of music theory instructional material, and a search for the explanation of the possible differences in learning outcomes between demographic groups. This project has suggested that music theory students receive an enhanced learning opportunity when instructional material is systematically adapted for the learning styles of individual students; the proposed study will further examine and explore this hypothesis.

APPENDIX A

INSTRUCTIONAL SEQUENCE #1

"Closely Related Keys"

Instructional Texts

Music Theory Pedagogy Research Project
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continue

Introduction

The objective of this research project is to evaluate the effectiveness of various methods of presenting music theory instruction.

You will first be asked to complete a short pre-test.

After you finish the pre-test you will be asked to read a brief instructional text which explains the concept of "closely related keys" and you will be asked to answer the example questions which are contained within the instructional text.

Finally, you will be asked to complete a short post-test.

Your scores on the pre-test and the post-test will be compared to the scores of other participants in order to evaluate the effectiveness of different methods of presenting music theory instruction.

Your participation is greatly appreciated.

Participant Information

Participant Number (or Name): _____

Name of the college or university that you attend: _____

Age: _____

Male _____   Female _____

Last educational degree completed: *high school diploma*
                                            associate degree
                                            undergraduate degree
                                            graduate degree

Are you a music major?

yes _____   no _____

How many semesters of music theory have you completed? _____

Have you studied music theory in connection with individual piano instruction?

yes _____   no _____

Did you study music theory as part of your high school curriculum?

yes _____   no _____

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After submitting the form please continue.

continue

Random Text Selection

One of two instructional texts will be randomly selected for you to read, after you complete the Pre-Test.

Click here to go to a random page

Pre-Test

1. Are the keys of C major and E*b* major closely related?

yes _____

no _____

2. Are the keys of C major and A major closely related?

yes _____

no _____

3. Are the keys of F major and g minor closely related?

yes _____

no _____

4. Are the keys of g minor and B*b* major closely related?

yes _____

no _____

5. Are the keys of F major and a minor closely related?

yes _____

no _____

6. What is the relationship between the keys of D major and G major?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

7. What is the relationship between the keys of Eb major and f minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

8. What is the relationship between the keys of C major and f minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

9. What is the relationship between the keys of *Ab* major and *Eb* major?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

10. What is the relationship between the keys of D major and e minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

Participant Number (or Name): _____

Please select Test Form "A":   *Test Form A*
                                     Test Form B

submit

After submitting the form please continue.

continue

Instructional Text #1

The following instructional text will explain the concept of "closely related keys." Some of the terms in this text may differ from the terminology that you have used during your study of music theory. When you answer the questions on the post-test please consider the terminology described in this text.

Closely Related Keys

Keys are said to be "closely related" when the key signatures of two keys differ by only one accidental. For example, the keys closely related to C major are d minor, e minor, F major, G major, and a minor. You may notice that these keys correlate to the pitches of the C major scale, with the exception of "B."

The keys closely related to c minor are E*b* major, f minor, g minor, A*b* major, and B*b* major. You may notice that these keys correlate to the pitches of the natural c minor scale, with the exception of "D," and you may also notice that these keys are the same as the closely related keys to the relative major of c minor, E*b* major.

Keys Related by Modal Mixture

Keys are said to be "related by modal mixture" if a key is closely related to the parallel minor or parallel major of the original key (including the parallel major or minor key itself). For example, the closely related keys to C major are E*b* major, f minor, g minor, A*b* major, and B*b* major; and the closely related keys to c minor are d minor, e minor, F major, G major, and a minor.

The "Neapolitan" Key Relationship

The "neapolitan" key is a key built on the lowered second scale degree, for instance D*b* is the "neapolitan" to C major; the "neapolitan" is sometimes considered to be "related by modal mixture." When you answer questions on the post-test you may either include or not include the "neapolitan" as a key "related by modal mixture."

Keys that are "Not Closely Related"

Keys are said to be "not closely related" if two keys do not meet the descriptions of being either "closely related" or "related by modal mixture." C major and F# major, for example, are "not closely related."

Please continue by answering the following practice questions.

practice questions

Practice Question #1

What are the closely related keys to G major?

(Think of the answer to the question and write it down on a sheet of paper, or try to remember your answer. When you are ready, please proceed by checking your response with the correct answer).

[Answer](#)

Answer to Practice Question #1

The closely related keys to G major are:

a minor, b minor, C major, D major, and e minor.

Practice Question #2

What are the closely related keys to d minor?

(Think of the answer to the question and write it down on a sheet of paper, or try to remember your answer. When you are ready, please proceed by checking your response with the correct answer).

[Answer](#)

Answer to Practice Question #2

The closely related keys to d minor are:

F major, g minor, a minor, B*b* major, and C major.

The keys closely related to a minor key are the relative major key (in this case F major) and the keys which are closely related to the relative major key.

Practice Question #3

What are the keys related to D major by modal mixture?

(Think of the answer to the question and write it down on a sheet of paper, or try to remember your answer. When you are ready, please proceed by checking your response with the correct answer).

[Answer](#)

Answer to Practice Question #3

The keys related to D major by modal mixture are:

d minor, F major, g minor, a minor, B*b* major, and C major.

The keys which are related to D major by modal mixture are the parallel minor key (d minor) and the keys which are closely related to the parallel minor key.

Practice Question #4

What are the keys related to f minor by modal mixture?

(Think of the answer to the question and write it down on a sheet of paper, or try to remember your answer. When you are ready, please proceed by checking your response with the correct answer).

Answer

Answer to Practice Question #4

The keys related to f minor by modal mixture are:

F major, g minor, a minor, B*b* major, C major, and d minor.

The keys which are related to f minor by modal mixture are the parallel major key (F major) and the keys which are closely related to the parallel major key.

Practice Question #5

What is the "Neapolitan" key in relation to g minor?

(Think of the answer to the question and write it down on a sheet of paper, or try to remember your answer. When you are ready, please proceed by checking your response with the correct answer).

[Answer](#)

Answer to Practice Question #5

The "Neapolitan" key in relation to g minor is A*b* major.

The "Neapolitan" key is a major key built upon the lowered second scale degree of the original key.

When you answer the questions on the post-test you may either include or not include the "Neapolitan" key as a key "related by modal mixture."

Practice Question #6

What are some of the keys that are "not closely related" to F major?

(Think of the answer to the question and write it down on a sheet of paper, or try to remember your answer. When you are ready, please proceed by checking your response with the correct answer).

[Answer](#)

Answer to Practice Question #6

Some of the keys which are "not closely related" to the key of F major include G major, B major, b minor, and e*b* minor, but there are many other correct answers to the question.

Keys are said to be "not closely related" if they do not meet the descriptions of being either "closely related" or "related by modal mixture."

Thank you for answering the practice questions.

Please continue by completing the post-test.

Post-Test

Post-Test

1. Are the keys of C major and E*b* major closely related?

yes _____

no _____

2. Are the keys of C major and A major closely related?

yes _____

no _____

3. Are the keys of F major and g minor closely related?

yes _____

no _____

4. Are the keys of g minor and B*b* major closely related?

yes _____

no _____

5. Are the keys of F major and a minor closely related?

yes _____

no _____

6. What is the relationship between the keys of D major and G major?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

7. What is the relationship between the keys of Eb major and f minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

8. What is the relationship between the keys of C major and f minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

9. What is the relationship between the keys of *Ab* major and *Eb* major?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

10. What is the relationship between the keys of D major and e minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

Participant Number (or Name): _____

Please select Test Form "E":   *Test Form E*
                                 Test Form F

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After submitting the form please continue.

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You have completed the instructional sequence.

Thank you for participating in this research project.

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APPENDIX B

INSTRUCTIONAL SEQUENCE #2

"Closely Related Keys"

Instructional Texts

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Pre-Test

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no _____

2. Are the keys of C major and A major closely related?

yes _____

no _____

3. Are the keys of F major and g minor closely related?

yes _____

no _____

4. Are the keys of g minor and B*b* major closely related?

yes _____

no _____

5. Are the keys of F major and a minor closely related?

yes _____

no _____

6. What is the relationship between the keys of D major and G major?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

7. What is the relationship between the keys of Eb major and f minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

8. What is the relationship between the keys of C major and f minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

9. What is the relationship between the keys of *Ab* major and *Eb* major?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

10. What is the relationship between the keys of D major and e minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

Participant Number (or Name): _____

Please select Test Form "A":   _Test Form A_
                                         Test Form B

<u>submit</u>

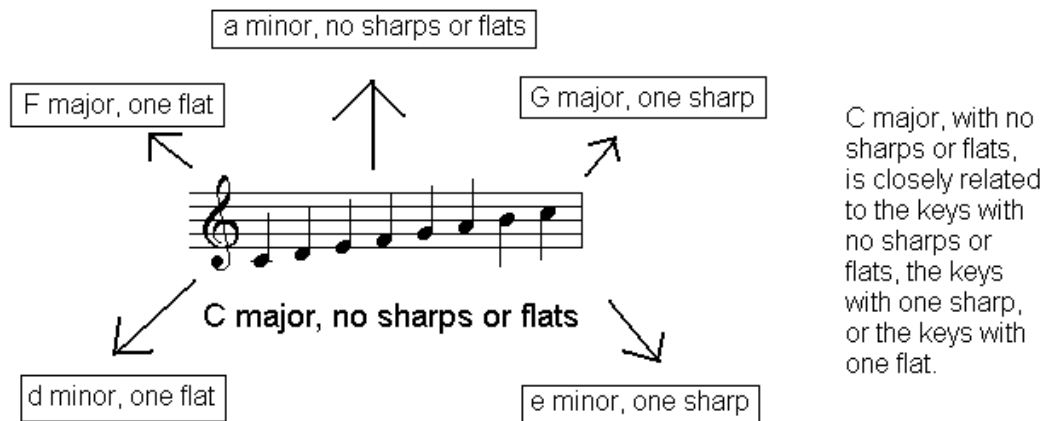## After submitting the form please continue.

<u>continue</u>

Instructional Text #2

The following instructional text will explain the concept of "closely related keys." Some of the terms in this text may differ from the terminology that you have used during your study of music theory. When you answer the questions on the post-test please consider the terminology described in this text.

Keys are said to be "closely related" when the key signatures of two keys differ by only one accidental. For example, the keys closely related to C major are d minor, e minor, F major, G major, and a minor. You may notice that these keys correlate to the pitches of the C major scale, with the exception of "B."

Keys Closely Related to C major

a minor, no sharps or flats

F major, one flat

G major, one sharp

C major, no sharps or flats

d minor, one flat

e minor, one sharp

C major, with no sharps or flats, is closely related to the keys with no sharps or flats, the keys with one sharp, or the keys with one flat.

C major, no sharps or flats

d minor, one flat

d minor, with one flat,
is closely related to
C major.

C major, no sharps or flats

e minor, one sharp

e minor, with one sharp,
is closely related to
C major.

C major, no sharps or flats

F major, one flat

F major, with one flat,
is closely related to
C major.

C major, no sharps or flats

G major, one sharp

G major, with one sharp,
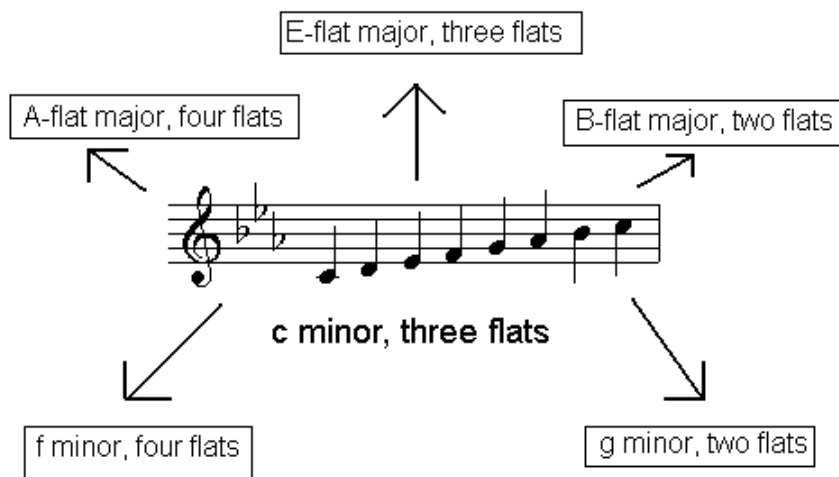is closely related to
C major.

C major, no sharps or flats

a minor, no sharps or flats

a minor, with no sharps
or flats, is closely related
to C major.

Keys Closely Related to c minor

The keys closely related to c minor are E*b* major, f minor, g minor, A*b* major, and B*b* major. You may notice that these keys correlate to the pitches of the natural c minor scale, with the exception of "D," and you may also notice that these keys are the same as the closely related keys to the relative major of c minor, E*b* major.

E-flat major, three flats

A-flat major, four flats

B-flat major, two flats

c minor, with three flats, is closely related to the keys with two flats, three flats, or four flats.

c minor, three flats

f minor, four flats

g minor, two flats

c minor, three flats

E-flat major, three flats

E-flat major, with three flats is closely related to c minor.

c minor, three flats

g minor, two flats

g minor, with two flats, is closely related to c minor.

c minor, three flats

f minor, four flats

f minor, with four flats, is closely related to c minor.

c minor, three flats

A-flat major, with four flats

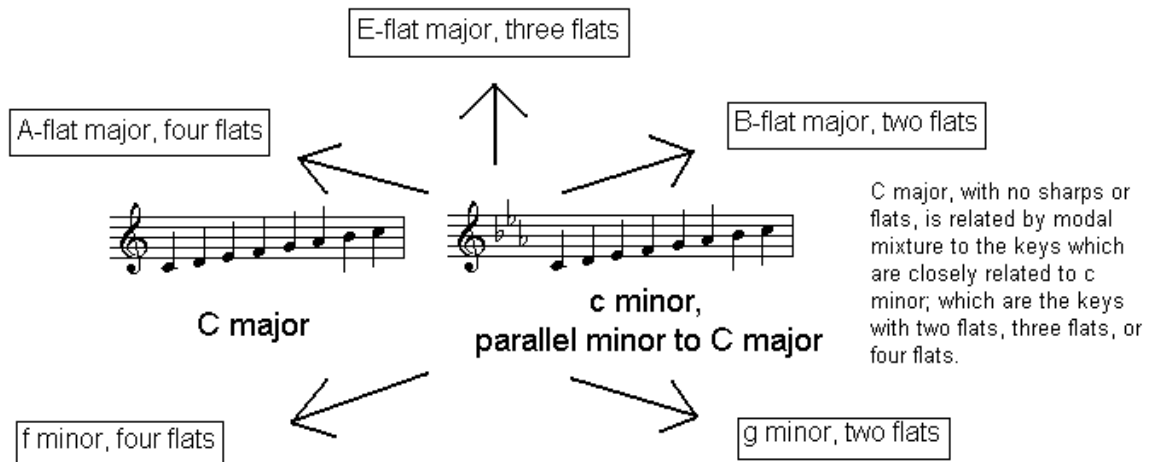A-flat major, with four flats, is closely related to c minor.

c minor, three flats

B-flat major, two flats

B-flat major, with two flats, is closely related to c minor.

94

Keys Related to C major by Modal Mixture

Keys are said to be "related by modal mixture" if a key is closely related to the parallel minor or parallel major of the original key (including the parallel major or minor key itself). For example, the closely related keys to C major are E*b* major, f minor, g minor, A*b* major, and B*b* major.
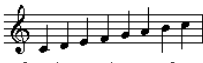

E-flat major, three flats

A-flat major, four flats

B-flat major, two flats

C major

c minor,
parallel minor to C major

C major, with no sharps or flats, is related by modal mixture to the keys which are closely related to c minor; which are the keys with two flats, three flats, or four flats.

f minor, four flats

g minor, two flats

C major, no sharps or flats

c minor, three flats

c minor is related to C major by modal mixture because c minor is the parallel minor to C major.

C major, no sharps or flats
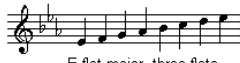
E-flat major, three flats

E-flat major is related to C major by modal mixture.

E-flat major, with three flats, is closely related to the parallel minor key of c minor, with three flats.
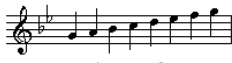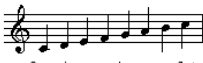

C major, no sharps or flats

f minor, four flats

f minor is related to C major by modal mixture.

f minor, with four flats, is closely related to the parallel minor key of c minor, with three flats.

C major, no sharps or flats

g minor, two flats

g minor is related to C major by modal mixture.

g minor, with two flats, is closely related to the parallel minor key of c minor, with three flats.
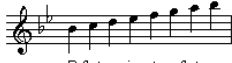

C major, no sharps or flats

A-flat major, with four flats

A-flat major is related to C major by modal mixture.

A-flat major, with four flats, is closely related to the parallel minor key of c minor, with three flats.
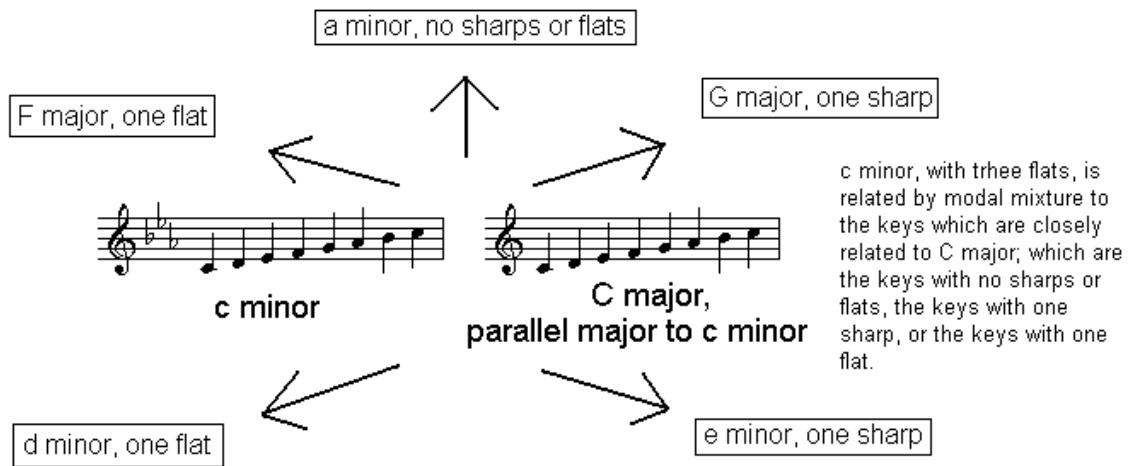

C major, no sharps or flats

B-flat major, two flats

B-flat major is related to C major by modal mixture.

B-flat major, with two flats, is closely related to the parallel minor key of c minor, with three flats.

Keys Related to c minor by Modal Mixture

The keys related to minor keys by modal mixture are the keys which are closely related to the parallel major key. The keys which are related to c minor by modal mixture are the keys which are closely related to C major; d minor, e minor, F major, G major, and a minor.

a minor, no sharps or flats

F major, one flat

G major, one sharp

c minor, with trhee flats, is related by modal mixture to the keys which are closely related to C major; which are the keys with no sharps or flats, the keys with one sharp, or the keys with one flat.

c minor

C major, parallel major to c minor

d minor, one flat

e minor, one sharp

c minor, three flats

C major, no sharps or flats

C major is related to c minor by
modal mixture because C major
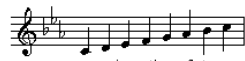is the parallel major to c minor.

c minor, three flats

d minor, one flat

d minor is related to c minor
by modal mixture.

d minor, with one flat,
is closely related to the
parallel major key of C
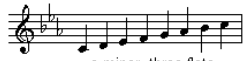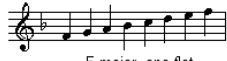major, with no sharps or flats.

c minor, three flats

e minor, one sharp

e minor is related to
c minor by modal mixture.

e minor, with one sharp,
is closely related to the parallel
major key of C major, with no
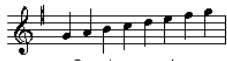sharps or flats.

c minor, three flats

F major, one flat

F major is related to
c minor by modal mixture.

F major, with one flat,
is closely related to the
parallel major key of C
major, with no sharps or flats.

c minor, three flats

G major, one sharp

G major is related to
c minor by modal mixture.

G major, with one sharp,
is closely related to the parallel
major key of C major, with no
sharps or flats.

c minor, three flats

a minor, no sharps or flats

a minor is related to
c minor by modal mixture.

a minor, with no sharps or flats,
is closely related to the parallel
major key of C major, with no
sharps or flats.

98

The "Neapolitan" Key

The "neapolitan" key is a key built on the lowered second scale degree, for instance D*b* is the "neapolitan" to C major; the "neapolitan" is sometimes considered to be "related by modal mixture." When you answer questions on the post-test you may either include or not include the "neapolitan" as a key "related by modal mixture."

c minor

D-flat major

D-flat is the lowered second scale degree of the key of c minor

D-flat major is the "neapolitan" key to c minor (or C major), because D-flat is the lowered second scale degree of the key of c minor (or C major).

Keys that are "Not Closely Related"

Keys are said to be "not closely related" if two keys do not meet the descriptions of being either "closely related" or "related by modal mixture."

C major, no sharps or flats

F# major, six sharps

C major, with no sharps or flats, and F# major, with six sharps, are not closely related.

Please complete the following practice questions. The computer will tell you if your answers are correct.

practice questions

Practice Question #1

Are the keys of G major and C major closely related?

[yes](#)

[no](#)

Correct

The keys of G major and C major are closely related.

continue

Incorrect

The keys of G major and C major are closely related.

Practice Question #2

Are the keys of G major and D major closely related?

[yes](yes)

[no](no)

Correct

The keys of G major and D major are closely related.

[continue](#)

Incorrect

The keys of G major and D major are closely related.

Practice Question #3

Are the keys of E*b* major and e minor closely related?

[yes](#)

[no](#)

Incorrect

The keys of E*b* major and e minor are not closely related.

Correct

The keys of E*b* major and e minor are not closely related.

Practice Question #4

Are the keys of A*b* major and A major closely related?

[yes](#)

[no](#)

Incorrect

The keys of A*b* major and A major are not closely related.

Correct

The keys of A*b* major and A major are not closely related.

Practice Question #5

Are the keys of D major and E major closely related?

[yes](#)

[no](#)

Incorrect

The keys of D major and E major are not closely related.

Correct

The keys of D major and E major are not closely related.

continue

Practice Question #6

What type of relationship is there between the keys of D major and G major?

the keys are closely related

the keys are related by modal mixture

the keys are not closely related

Correct

The keys of A major and D major are closely related.

Incorrect

The keys of A major and D major are closely related.

Incorrect

The keys of A major and D major are closely related.

Practice Question #7

What type of relationship is there between the keys of A major and d minor?

[the keys are closely related](#)

[the keys are related by modal mixture](#)

[the keys are not closely related](#)

Incorrect

The keys of A major and d minor are related by modal mixture.

Correct

The keys of A major and d minor are related by modal mixture.

Incorrect

The keys of A major and d minor are related by modal mixture.

Practice Question #8

What type of relationship is there between the keys of G major and D major?

[the keys are closely related](#)

[the keys are related by modal mixture](#)

[the keys are not closely related](#)

Correct

The keys of G major and e minor are closely related.

Incorrect

The keys of G major and e minor are closely related.

Incorrect

The keys of G major and e minor are closely related.

continue

Practice Question #9

What type of relationship is there between the keys of G major and a minor?

[the keys are closely related](#)

[the keys are related by modal mixture](#)

[the keys are not closely related](#)

Correct

The keys of G major and a minor are closely related.

Incorrect

The keys of G major and a minor are closely related.

Incorrect

The keys of G major and a minor are closely related.

Practice Question #10

What type of relationship is there between the keys of F major and a minor?

[the keys are closely related](#)

[the keys are related by modal mixture](#)

[the keys are not closely related](#)

Correct

The keys of F major and a minor are closely related.

[continue](#)

Incorrect

The keys of F major and a minor are closely related.

Incorrect

The keys of F major and a minor are closely related.

Thank you for answering the practice questions.

Please continue by completing the post-test.

Post-Test

Post-Test

1. Are the keys of C major and E*b* major closely related?

yes _____

no _____

2. Are the keys of C major and A major closely related?

yes _____

no _____

3. Are the keys of F major and g minor closely related?

yes _____

no _____

4. Are the keys of g minor and B*b* major closely related?

yes _____

no _____

5. Are the keys of F major and a minor closely related?

yes _____

no _____

6. What is the relationship between the keys of D major and G major?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

7. What is the relationship between the keys of Eb major and f minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

8. What is the relationship between the keys of C major and f minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

9. What is the relationship between the keys of *Ab* major and *Eb* major?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

10. What is the relationship between the keys of D major and e minor?

the keys are closely related _____

the keys are related by modal mixture _____

the keys are not closely related _____

Participant Number (or Name): _____

Please select Test Form "E":   _Test Form G_
                                     Test Form H

submit

After submitting the form please continue.

continue

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