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Undergraduate students often find music theory courses to be among the most difficult and sometimes most frustrating experiences of their early college careers. The difficulty may stem from the tendency of music theory instruction to rely heavily upon 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 cognitive abstraction. This essay will explore the process of adapting music theory instructional material for the learning styles of individual students.

Individuals use a variety of methods during the learning process and each student has a preferred style of learning. D. A. Kolb has proposed a typology of individual learning styles based upon 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 which an individual tends to use when processing new concepts. An instructor may consider Kolb's typology during the process of developing instructional material, and thereby adapt his or her teaching strategies so that each of Kolb's learning style "types" will benefit from appropriately directed instruction.

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 toward visual vs. language-based cognition, as well as a number of individual personality

[1]David A. Kolb, *Experiential Learning; Experience as the Source of Learning and Development* (Englewood Cliffs, NJ: Prentice Hall, 1984). 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 in the area of learning styles theory and was the originator of the theory of experiential learning.

characteristics help to define an individual's "learning style." Research in the field of individual learning styles informs 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. Although some of these paradigms differ from each other in significant ways, 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.[2] Some of the most significant studies on learning styles theory include Fox (1984)[3] and Armstrong & McDaniel (1986),[4] who assess learning styles among adult learners in various post-secondary environments, Eiszler (1982),[5] who studies the learner's preferred sense modality, and Riding and Boardman (1983),[6] who study adult learning style in terms of performance on the Test of Embedded Figures (Cuthbert, 1971).[7]

A variety of psychometric instruments have been developed to assess the preferred learning style of an individual; most of these describe bipolar pairs of specific personality traits in a manner

[2]Schmeck's definition of learning style is given in "Learning Styles of College Students," in *Individual Differences in Cognition*, ed. Ronna F. Dillon and Robert R. Schmeck (New York: Academic Press, 1983), 233-79.

[3]R. D. Fox, "Learning Styles and Instructional Preferences in Continuing Education for Health Professionals: A Validity Study of the LSI," *Adult Education Quarterly* 35 (1984): 72-85.

[4]P. Armstrong and E. McDaniel, "Relationships Between Learning Styles and Performance on Problem-Solving Tasks," *Psychological Reports* 59 (1986): 1135-8.

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

[6]R. J. Riding and D. J. Boardman, "The Relationship Between Sex and Learning Style and Graphicacy in 14 Year Old Children," *Educational Review* 35 (1983): 69-79.

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

derived from the Jungian theory of "types."[8] Some researchers have attempted to extend Kolb's model by blending the concept of experiential learning with concepts from other approaches to the issue of learning styles. Merritt & Marshall (1984)[9] and Sewall (1986)[10] have studied the psychometric properties of the various learning styles instruments.

Kolb's 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 either 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

[8]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, also corresponding closely to the Jungian typology.

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 (Introversion-Extraversion, Thinking-Feeling, Intuition-Sensing), to which Myers-Briggs adds a fourth (Judging-Perceiving).The Personality Style Indicator, designed by R. Craig Hogan and David W. Champagne, is based on the Myers-Briggs indicator and similarly reflects the Jungian typology of conscious functioning. It describes the following bipolar pairs: Introvert-Extrovert, Thinking-Feeling, Intuitive-Sensing, and Perceiving-Judging.

The texts of many psychometric instruments may be found on a number of internet sites and are frequently re-published in a variety of printed media. The Grasha-Riechmann Student Learning Style Scales have been published in several of the authors' works, including Grasha's *Teaching with Style; A Practical Guide to Enhancing Learning by Understanding Teaching & Learning Styles* (Pittsburgh, PA: 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 its text may be found on the world wide web.

[9]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* 24 (1984): 463-72.

[10]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.

into generalized theories. A person will then ultimately test these theories through active experimentation. Figure 1 is a representation of the learning cycle.[11]

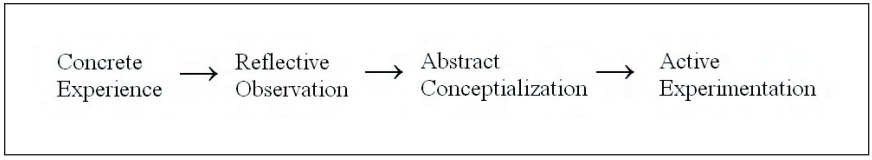

Figure 1. The Learning Cycle

Kolb's typology 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 rather than a concrete cognitive modality (in terms of concrete experience compared to abstract conceptualization) is described as a distinct dimension of learning style; and the tendency for knowledge to be transformed in a reflective rather than 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 formed by the intersection of these axes.

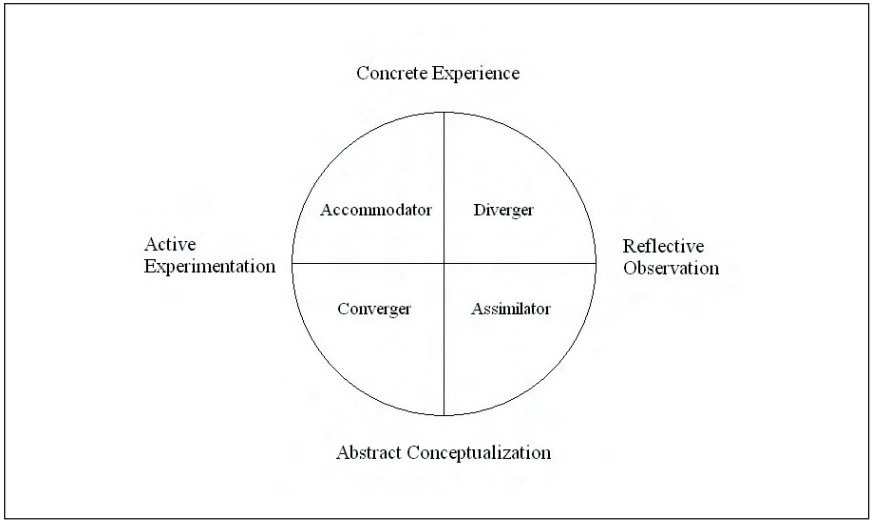

Figure 2. Learning Style Modality as x-y Axes and Learning Style Types as Quadrants

[11]Figures 1 and 2 are derived from Kolb's description of the learning process in *Experiential Learning* (1984), 20-38.

Kolb's cognitive dimension of active-experimentation vs. reflective-observation may 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*.[12]

In a similar manner, Kolb's cognitive dimension of concrete-experience vs. abstract-conceptualization may 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 observed 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.[13] William Shakespeare distinguished between the connotations of "apprehend" and "comprehend" in the last act of *A Midsummer Night's Dream*.[14]

> 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), for use in determining the types of learning styles an individual tends to use most often. The original Learning Style Inventory was developed in 1974, but Kolb and others have

[12]Jung describes the process that Kolb refers to as the "acquisition" of knowledge in *Psychological Types*, see the edition translated by R. F. C. Hull (Princeton, NJ: Princeton University Press, 1977), 12-68.

[13]James describes this process as the "transformation" of knowledge in *The Principles of Psychology* (New York: Holt, Rinehart and Winston, 1890), vol. 1, 221-2.

[14]William Shakespeare, *A Midsummer Night's Dream*, V/i/4-6. See the New Cambridge Shakespeare edition (Cambridge: Cambridge University Press, 2003), 124.

continued to improve and update the inventory since that time, in addition to developing other similar psychometric instruments.[15]

The Learning Style Inventory (LSI) defines four types of learners: the Accommodator, 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 is likely to be used most often.[16] Given below are brief descriptions of the four types of learners.

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

[15]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 concrete cognition, and AE subtracted from RO reflects a bias toward reflection or active cognition. Kolb's LSI is distributed by McBer & Company in Boston, MA, 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, MA: McBer & Company, 1986). The validity and reliability of the LSI has been the subject of several recent studies, including Robert K. Henson and Dae-Yeop Hwang, "Variability and Prediction of Measurement Error in Kolb's Learning Style Inventory Scores: A Reliability Generalization Study," *Educational and Psychological Measurement* 62 (2002): 712-27, and Iain Garner, "Problems and Inconsistencies with Kolb's Learning Styles," *Educational Psychology* 20 (2000): 341-8. A significantly different version of the LSI, developed by Rita Dunn, Kenneth Dunn, and Gary E. Price, is provided as an appendix to Dunn's *Teaching Students Through Their Individual Learning Styles: A Practical Approach* (Reston, VA: Reston Publishing Company, 1978).

[16]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, CA: Jossey-Bass, 1978), 106-7.

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.

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 upon 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 theoretical structure 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. In the current essay I will attempt 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. 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 several specific 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.[17]

Many of the existing methodologies for adapting instructional material to the learning styles of individual students require that the learning styles of each student in a class first be assessed, and that instructional material then be adapted for the specific individual learners. The process of adapting instrucional material directly for individual learners is associated with the concept of "individualized instruction." Dunn's methodology includes elements of the "individualized instruction" approach to the development of instructional material.[18] In the current study, Dunn's methodology is extended by simultaneously adapting a

[17]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*, also see Rita Dunn's *How to Implement and Supervise a Learning Style Program* (Alexandria, VA: Association for Supervision and Curriculum Development, 1996). ED 395367. Other significant methodologies for the adaptation of content material to the requirements of individual student learning styles include the "4MAT" system developed by B. McCarthy, see McCarthy's *The 4Mat System: Teaching Learning Styles with Right/Left Mode Techniques* (Barrington, Illinois: Excel Inc., 1985) and Stephanie Kadel's strategy known as "problem centered learning," see Kadel's *Problem-Centered Learning in Mathematics and Science* (Washington, D.C.: Office of Educational Research and Improvement, 1992). ED 342681.

[18]Rita Dunn provides a description of "individualized instruction" in *Teaching Students Through Their Individual Learning Styles: A Practical Approach*, 1-24. See also Rita Dunn and Shirley A. Griggs, *Practical Approaches to Using Learning Styles in Higher Education* (Westport, CT: Bergin & Garvey, 2000). Important publications concerning the issue of "individualized instruction" include Samuel Messick, ed., *Individuality in Learning* (San Francisco, CA: Jossey-Bass, 1976) and Roger Hiemstra and Burton Sisco, *Individualized Instruction* (San Francisco, CA: Jossey-Bass, 1990).

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 may 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.[19]

Accommodators (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 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 may 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 experience should be given an opportunity to see several examples of each new concept 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. Reflective observation could be a process for class

[19]See Rita Dunn's *How to Implement and Supervise a Learning Style Program*, 32-3.

discussion and review of student compositions, which would then be revised and analyzed. Composition may seem to be an active experimenting process, but in actual practice the creation of new music requires both reflection and the internalization of new analytical concepts.

Experienced music theory teachers have often observed that some students seem to benefit substantially from the process of mentally hearing or silently rehearsing musical structures, in some cases even responding to analytical tasks more successfully when musical examples are heard rather than read. Other students tend to recognize theoretical concepts and analytical formulations much better in written form than in the actual sound-environment of a musical performance. Theory teachers usually attempt to address difficulties experienced by students who may represent either of these extremes by directly attempting to alter the students' preferred method of musical apprehension, sometimes suppressing important and uniquely individualized cognitive modalities for hearing and comprehending musical structure. Although the perception and cognitive understanding of Western art music relies significantly upon the process of responding directly to sound, or at least to the sounds that theorists have traditionally regarded as musically important, I will only attempt to address the issue of the individual learning strategies that students may apply to the cognitively abstract task of musical analysis.

An important dimension of Kolb's modality of concrete experience, as applied to music theory, is the question of "concrete hearing" vs. "concrete visualization" of a musical text. In order to provide a concrete experience for each of these sub-modalities, musical examples should always be played for the students. Learners who prefer the modality of abstract conceptualization will, of course, either "hear" or "visualize" musical texts internally, but even for these students the process of performing musical examples may slightly benefit students who prefer the sub-modality of "abstract hearing."[20]

Given below are examples of music theory instructional procedures adapted for each of Kolb's four learning style types.

[20]Rita Dunn has identified four distinct sense-modalities for the learning process among child and adolescent learners: auditory learning, visual learning, tactual learning, and kinesthetic learning, see Dunn's *Teaching Students Through Their Individual Learning Styles: A Practical Approach*, 13-5.

The learning objective is the ability to analyze secondary-dominant sonorities; the student is assumed to have previously acquired the necessary skills to analyze diatonic common-practice musical texture in terms of "roman numeral" analytical notation. The concept of sonorities with secondary-dominant function may 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.[21]

Individuals with the *Accommodator* learning style grasp information through concrete experience and process it through

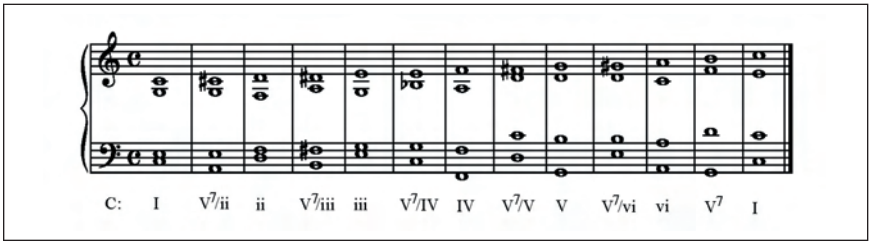

Figure 3. Concrete Examples of Secondary-Dominant Function

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 4. Abstract Description of Secondary-Dominant Function

[21]Figure 4 provides a slightly altered version of a procedure for recognizing secondary dominants found in Stefan Kostka and Dorothy Payne's *Tonal Harmony*, 5th ed. (New York: McGraw-Hill, 2004), 248-49, 265.

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.[22] To facilitate active experimentation, students should be asked to analyze the secondary dominant sonorities found in an example, such as Figure 5, and then asked to complete a realization assignment, such as Figure 6. Students should complete the assignment without assistance, but after the exercise is finished, 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

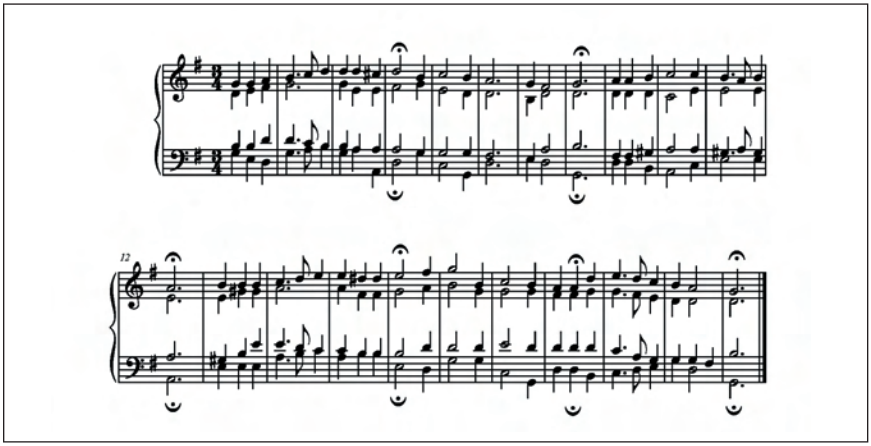

Figure 5. Further Example for the Modality of Concrete Experience

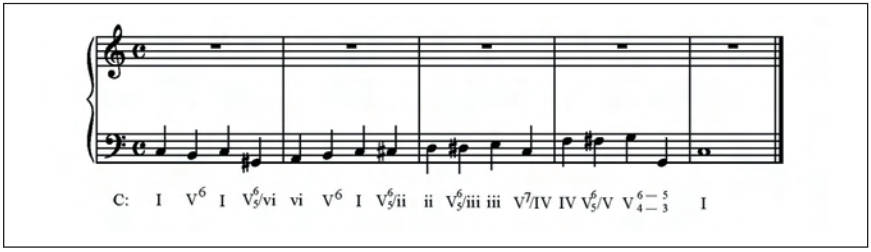

Figure 6. Analytical Exercise for the Modality of Active Experimentation
Directions: Complete the soprano, alto, and tenor voice parts in chorale texture.

[22]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.

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 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. To facilitate reflective observation, Figure 5 should be demonstrated through an instructor-guided comparison of the concrete examples from Figure 3 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 provide an opportunity to grasp the concept of

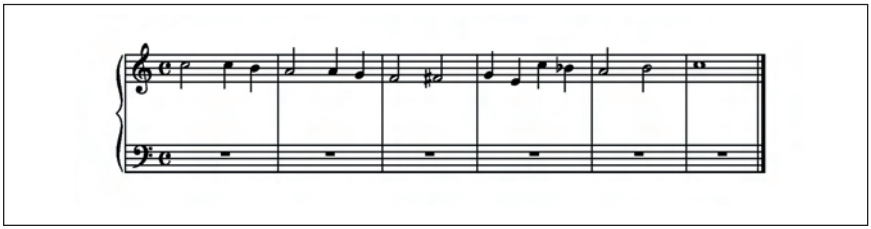

Figure 7. Analytical Exercise for the Modality of Reflective Observation
Directions: Compose the bass line and accompanying material in any musical texture

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 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.[23] Other examples may be used that demonstrate secondary-dominant sonorities in different musical textures (such as chamber or orchestral scores). To facilitate active experimentation, students should be asked to analyze the secondary-dominant sonorities found in an example

[23]George Frideric Handel, Sonata for Violin in B♭ Major, second mvt., mm. 1-71

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 completed, 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

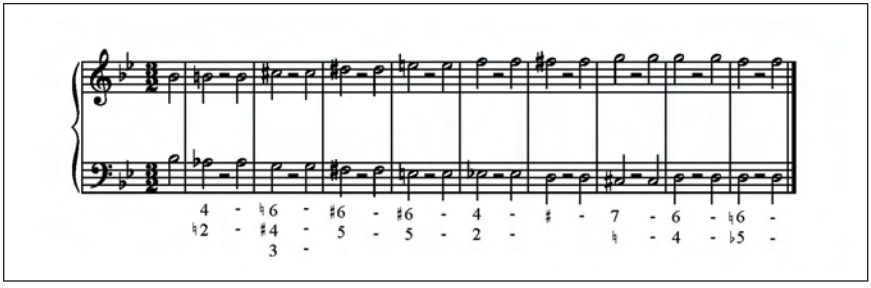

Figure 8. Further Example for the Modality of Abstract Conceptualization

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 that demonstrate secondary-dominant sonorities in different musical textures (such as chamber or orchestral scores). 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 shown 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 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, similar to Dunn's method of individualized adaptation for the school counselor education class. Since the majority of music theory instructional environments, especially within American colleges and universities, rely primarily upon group instruction or even large-group lectures, an efficient method for adapting Kolb's theoretical paradigm to the reality of the classroom may be to combine all of the individual adaptations suggested by the experiential learning model into a single integrated instructional plan. A possible methodology for the implementation of such a combined formulation is provided below.

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.
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.

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, i.e., the analysis of secondary-dominant sonorities.

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 to the learning modality of abstract conceptualization. Adaptation for the modality of concrete experience may 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 4).

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 may 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 6).

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 plan will combine all of the strategies described inprocedures 3, 4, 6, and 7.

This 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. By following the methodology an instructor is able to specifically address the needs of each of Kolb's four types of learners during the development of instructional material.

As an informal method of demonstrating the value of this methodology, a brief survey was conducted, primarily relying upon volunteers from the local population of undergraduate music theory students. One group of volunteers was presented with a computer-based instructional sequence corresponding to an adaptation for only the learning modality of abstract conceptualization, while the other group was presented with a computer-based instructional sequence adapted for all four of Kolb's learning-style types.

In general, students who were presented with the combined or integrated instructional sequence demonstrated a superior learning outcome, in terms of pre-test vs. post-test scores, than students who were presented with the more limited instructional sequence, suggesting that the use of instructional materials consistent with the goals of the methodology described in this essay may result in a more successful practical learning achievement than instructional materials or procedures that rely primarily upon a limited field of cognitive strategies. Table 1 documents the generally superior learning outcome of the students presented with the integrated instructional sequence compared to those presented with the limited instructional sequence, among individuals with an improvement greater than zero the integrated sequence resulted in a 40.4% improvement, while the limited sequence resulted in only a 32.3% improvement. Table 2 displays the generally more dramatic improvement in learning outcomes for students under the age of twenty than for those twenty years of age or older, in terms of the benefit derived from receiving the integrated rather than the limited instructional sequence; among individuals with an improvement greater than zero the difference in the rates of improvement for individuals under the age of twenty was 50.9% compared to 34.5%, while the difference for individuals twenty years of age or older was only 30.7% compared to 30.0%. Table 3 displays the generally more dramatic improvement in learning outcomes for female students than for their male colleagues, in terms of the benefit derived from receiving the integrated rather than the limited instructional sequence; among individuals with an improvement greater than zero the difference in the rates of improvement for females was 42.1% compared to 28.5%, while the difference for males was only 38.0% compared to 35.0%.[24] These results are consistent with the hypothesis that young adults and women tend more often toward concrete experiencing as an important modality for the learning process.

[24]Among the total population of male volunteers, the more limited instructional sequence actually produced better learning outcomes than the integrated or combined instructional sequence, 35.0% compared to 31.6%. This result is consistent with the hypothesis that males tend to favor the modality of abstract conceptualization more often than females.

The difficulty of either teaching or studying music theory successfully at the undergraduate level may, to a large extent, be compounded by the diversity of students' academic experiences. For some students an entirely abstract or almost mathematically symbolic language may be the best method of acquiring and mastering the academic content, while for others only concrete and realistic examples of specific musical techniques will allow the development of a sufficiently sophisticated understanding of the necessary theoretical concepts. Good teachers have always known that a variety of different approaches must be offered, and that both abstract and concrete modes of expression must have equal validity within the classroom. An instructor who attempts to represent and value the full range of human cognitive tendencies will not only succeed in minimizing the social and cultural barriers that many students face in their efforts to learn, but will also, at least partially, help to provide an equal opportunity for success to a student body that is increasingly diverse in terms of age, gender, and cultural history.

Table 1

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

	IS#1	IS#2
#P	19	31
#PIΔ>0	17	24
APre	52.6	53.5
APost	81.5	84.5
AI	28.9	31.2
AIΔ>0	32.3	40.4

#P	Number of Participants
#PIΔ>0	Number of Participants with an Improvement Greater than Zero
APre	Average Pre-test Score
APost	Average Post-test Score
AI	Average Improvement from Pre-Test to Post-Test
AIΔ>0	Average Improvement from Pre-Test to Post-Test, Among Participants with an Improvement Greater than Zero
IS#1	Instructional Sequence #1
IS#2	Instructional Sequence #2

Table 2

Comparison of 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	12	16	7	16
#PIΔ>0	11	11	6	14
APre	48.3	54.3	60.0	52.6
APost	80.0	89.3	84.2	79.3
AI	31.6	35.0	24.2	26.6
AIΔ>0	34.5	50.9	30.0	30.7

#P	Number of Participants
#PIΔ>0	Number of Participants with an Improvement Greater than Zero
APre	Average Pre-test Score
APost	Average Post-test Score
AI	Average Improvement from Pre-Test to Post-Test
AIΔ>0	Average Improvement from Pre-Test to Post-Test, Among Participants with an Improvement Greater than Zero
A<20	Participants with an Age Less than Twenty
A20+	Participants with an Age of Twenty or Above
IS#1	Instructional Sequence #1
IS#2	Instructional Sequence #2

Table 3

Comparison of 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	10	12	9	19
#PIΔ>0	10	10	7	14
APre	53.0	54.1	52.2	53.1
APost	88.0	85.8	74.4	83.6
AI	35.0	31.6	22.2	30.5
AIΔ>0	35.0	38.0	28.5	42.17

#P	Number of Participants
#PIΔ>0	Number of Participants with an Improvement Greater than Zero
APre	Average Pre-test Score
APost	Average Post-test Score
AI	Average Improvement from Pre-Test to Post-Test
AIΔ>0	Average Improvement from Pre-Test to Post-Test, Among Participants with an Improvement Greater than Zero
M	Male Participants
F	Female Participants
IS#1	Instructional Sequence #1
IS#2	Instructional Sequence #2

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