Development of Learning Outcome with Problem Solving Teaching Method for Undergraduate Students of Faculty of Fine Arts, Srinakharinwirot University, in Music Theory Course, Interval Chapter

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Abstract

This research aims to measure up the learning outcome of music theory course, interval chapter, from first-year undergraduates of Srinakharinwirot University. Employing common teaching method and problem solving teaching method, the research is processed with simple random sampling by lottery from 32 persons of first-year undergraduates of 2013 academic year. The sampling group is divided into two sixteen-person groups. Course's pre-test and post-test is applied as tools of research to analysis for statistic values including mean, S.D., and t-test.

The research shows learning outcome of the music theory course, interval chapter, from first-year undergraduates with common teaching method and problem solving teaching method. Learning outcome evaluation by pre-test and post-test is parted into five issues: writing key signature, writing interval note, accuracy of writing music notation signal, writing inversed interval, and accuracy of interval classification. Course's post-test demonstrates differences of the two teaching method in every issue. For the common teaching method experimental group, the highest-scored issue is accuracy of writing music notation signal, = 14.40, S.D. = 1.21934; and the lowest-scored issue is writing inversed interval, = 12.45, S.D. = 1.23554. On the other hand, the highest-scored issue of accuracy of interval classification, = 18.80, S.D. = 1.21080; and the lowest-scored issue of writing key signature, = 17.24, S.D. = 1.32410 are beaten by the problem solving teaching method experimental group. In overall post-test evaluation, the problem solving teaching method experimental group reaches higher scores than the common teaching method experimental group in all five issues with differences of post-test scores; statistical significant is set at 0.05.

Keywords: interval, problem solving teaching method, music education

Introduction

Department of Western Music, Faculty of Fine Arts, Srinakharinwirot University was risen from 1953 to 2013 and has created graduate students from two curriculums those are Bachelor of Fine Arts (B.F.A.) focusing on artist creation and Bachelor of Education Program (B.Ed.) focusing on pedagogue creation. Undergraduates are taught about music theories and performances, musical recreations inside and outside the university, and also develop virtue, ethic,

and code of conduct in both curriculum in order to create quality music artists and teacher. This is conform to National Education Act of Parliament 1999, second correction 2002, sixth topic stating that education arrangement have to develop Thai people to be completed with physical, mental, intellective, knowledge and ethic personality with culture and virtue in life to live normally in a society.

Music education arrangement for first-year students of Department of Western Music of both curriculum (B.F.A. and B.Ed.) which is the major and fundamental course that is basic for further advance courses, including harmony for second-year students, counterpoint for third-year students and composition for forth-year students. The mentioned course is music theory, studying about music notation arrangement, rhythm, scale, interval, cord and technical music term. These are the core of music theory for students in both curriculum to practice skills of analysis, synthesis, and integration concepts and theories of music. The skills can be advantage for not only in advance music theory, but also in academic music practice. This is conformed to Natcha Sotiyanurak (2002: preface) mentioning that music theory should be learnt as music practice; or learner should think that music theory must be practiced for fluency and understanding.

As the instructor of Music Theory course for first-year students since 2002 until present (2013), I have found that although students complete all course contents, they cannot accomplish satisfied learning outcome. Hypotheses include inadequacy of course content reviewing and exercise practicing. Or even because some students already have fine background knowledge in music theory resulting in boredom and lack of new knowledge learning inspiration. Furthermore, music theory is a lecture course that might not be interesting for learners. Kitti Rattanarangsri (2007: 7) stated that disadvantages of lecture teaching method are students play minor role and the method does not fulfill needs of differences of students. Thus, devel-

oping of other teaching method for music theory course might be advantages for better education administration. Additionally, the developed teaching method can be applied to others lecture-base courses. There are several student-center teaching methods including my current lecture teaching method that also has some weaknesses. An American undergraduate's, John Dewey, method or Problem Solving Method is another student-center teaching methods. Problem solving method emphasizes on systematical problem solving process and self-learning skill. This is conform to http://sixzoda.wordpress.com which affirms that problem solving teaching method is a learning activity administration by student-owner learning process. This method starts with problem stating, solving plan, hypothesis structuring, data collection, data verification, data analysis, and then conclusion. Instructor, or both instructor and student, will state the essential or unexperienced problems which do not exceed students' perception skill. Students, themselves, will solve and find the answer to the problems. Problem solving abilities of each student are difference and vary depend on their perception, knowledge, experience, motivation, and emotion. The instructor has to offer student an opportunity to expand their thought and problem solving practice. This will built-up professional skill and better perception. Consequently, problem solving method is proposed as a mean that can improve learning outcome of music theory subject. Music theory course content relates to other advance courses; for example Interval topic is elementally important for advance music theory course like choral course. It is also related to other course on music theory such as scale, cord, transpose, etc. Nattcha Sorktiyanurak's (2002: 95) work also supports about meaning and importance that it is the distance between two notes that tells the gap and tone characteristic. When two notes are played separately or together without any conditions of interval structures or positions, then an interval is created. Interval is the fundamental of triad and cord which

are also associated to choral. Interval analysis is one of modulation process, harmonic arrangement, and accompany melody composition. This shows that interval is important fundamental for basic to advance music theory study.

Accordingly, researcher is encouraged in doing research on problem solving method for learning outcome development in music theory course, interval chapter, for undergraduate students of faculty of Fine Arts, Srinakharinwirot University. Comparing the learning outcome from problem solving teaching method and common teaching method, the research procedure is applied to western music theory course, interval chapter, of first-year undergraduates from two curriculum. Problem solving method can be effectively employed to music theory course, interval chapter, because it systematically solves problems with scientific procedure. These include problem raising, hypothesis structuring, solving planning, experiment, data collection, data analysis, and conclusion. Systematical procedure helps in students' development of thought and intellect and research's scheme of experiment. Appling brain storming for problem solving, students will get concepts for learning integration. Students can gain experiences, various learning and activities that can answer to differences of need and their own character which support understand-

ing of learning content overview. Hence, problem solving teaching method is one of the means to improve learning outcome of Music Theory course, interval chapter, of first-year undergraduate students of faculty of Fine Arts, Srinakharinwirot University.

Methodology

Population and Samples

Populations and samples in this research are first-year students of 2013 academic year, department of Western Music, Faculty of Fine Art, Srinakharinwirot University. The samples are 25 students who register for MUS103 Music Theory 1, B.F.A. curriculum, and 10 students who register for MUE111 Music Theory 1, B.Ed. curriculum, or 35 people in total. Applying simple random sampling, 32-people population is selected by lottery, and then separated into two 16-people groups; students from two curriculum are mixed into two population group. All students enter to the university by university's direct admission examination 2013 with same set of examination of music theory, so they assumingly have resemble background knowledge of music theory.

Data Collection

Researcher has tough music theory course, in-

Table 1

Common Teaching Method	Problem Solving Method
1. Inform students the learning objectives	1. Inform students the learning objectives
2. Measure students' background knowledge with course pre-test	2. Measure students' background knowledge with course pre-test
3. Present learning content of scale structure for interval types, distance and then give students an exercise practice	3. Present learning content without teaching about scale structure but give student an opportunity to provide their own meaning by group brain storming, listening activity, auditory practice, music notation reading and music playing to conclude the answer and built-up their own knowledge and understanding
4. Measure students' knowledge with interval knowledge post-test that researcher has created and then evaluate the resulting scores in each part	4. Measure students' knowledge with interval knowledge post-test that researcher has created and then evaluate the resulting scores in each part

terval chapter, and parts the 32-people population into two 16-people groups. Frist group is taught with common teaching method while the second group is taught with problem solving method. The learning activities processes are described as the following Table 1.

Data Analysis

Analyze the data with comparison of learning outcome from the two population groups for statistical values including average (), standard deviation (S.D.), and t-test. Descriptive manner is employed for this analysis with cause comparison research.

Results

Research's result is divided into three parts: (1) initial data, (2) pre-test data, and (3) comparison analysis of learning outcome from both samples groups.

1. Background Information

There is 32-people population of first-year students of Department of Western Music, Faculty of Fine Arts, Srinakharinwirot University who register for music theory course. This 32-students experimental group consists of 22 female students (68.75 percent) and 10 male students (31.25 percent). Major subjects of the students include 10 students in brass and woodwind instrument, 9 students in piano, 7 students in string instrument, 4 students voice, and 2 students in percussion instrument or representing 31.25, 28.125, 21.875, 12.5, and 6.25 percent respectively.

2. Pre-Test Data

For pre-test measuring of interval chapter, it is found that students complete the test with score of (ranged from highest scores) notation signal writing (= 11.45, S.D. = 1.14593), key signature writing (= 10.95, S.D. = 1.53811), interval notation writing (= 10.45, S.D. = 1.23438), accuracy of interval classification (= 9.85, S.D. = 1.38697), and interval inversion writing (= 9.40, S.D. = 1.53554) respectively. This shows that students do not accomplish satisfied learning outcome of music theory course. The rea-

sons might be because some students have never studied on interval inversion writing, but still have background knowledge on interval writing and interval classification. Moreover, students who have practiced music instruments like piano, guitar or violin can gain experience and understanding on interval playing. On the other hand, students who have practiced percussion instrument and voice might not understand about interval classification and interval inversion because they do not utilize it in real music practice. However, the pre-test data reveals that these students have similar background knowledge on music theory in interval topic. Thus, they are appropriate to be sample group of the research.

3. Comparison Analysis of Learning Outcome from Both Population Groups

Completing the music theory course on interval topic, both student groups on common teaching method and problem solving method have distinctive learning outcome; shown as the following Table 2.

3.1 Analysis of learning outcome from both experimental groups on the topic, key signature writing, discloses that problem solving group get higher scores than common teaching method group. Score differences are averaged at 3.99 from 20, or 19.95 percent.

3.2 Analysis of learning outcome from both experimental groups on the topic, interval notation writing, discloses that problem solving group get higher scores than common teaching method group. Score differences are averaged at 3.65 from 20, or 18.25 percent.

3.3 Analysis of learning outcome from both experimental groups on the topic, notation signal writing, discloses that problem solving group get higher scores than common teaching method group. Score differences are averaged at 3.35 from 20, or 16.75 percent.

3.4 Analysis of learning outcome from both experimental groups on the topic, interval inversion writing, discloses that problem solving group get

Table 2

Test topic on interval	Scores of common teaching method group		Scores of problem solving method group	
	x̄	S.D.	x̄	S.D.
1. Key signature writing	13.25	1.53553	17.24	1.32410
2. Interval notation writing	13.80	1.27728	17.45	1.20932
3. Notation signal writing	14.40	1.21934	17.75	1.22561
4. Interval inversion writing	12.45	1.23554	18.25	1.21957
5. Accuracy of interval classification	13.55	1.37282	18.80	1.21080
Total	**67.45**	**1.32810**	**89.49**	**1.23788**

higher scores than common teaching method group. Score differences are averaged at 5.8 from 20, or 29 percent.

3.5 Analysis of learning outcome from both experimental groups on the topic, accuracy of interval classification, discloses that problem solving group get higher scores than common teaching method group. Score differences are averaged at 5.25 from 20, or 26.25 percent.

Comparison analysis from experimental groups' learning outcome exposes that pre-test and post-test scores from common teaching group and problem solving group are distinctive with statistical significant at 0.05. This is conformed to research hypothesis that common teaching and problem solving teaching method result in dissimilar learning outcome.

Discussion and Conclusions

This research, Development of Learning Outcome with Problem Solving Teaching Method for Undergraduate Students of Faculty of Fine Arts, Srinakharinwirot University, in Music Theory Course, Interval Chapter, presents main knowledge issue of interval in five topics. The five topics those are taught with problem solving method obtain higher score than students who are taught with common teaching method as shown below.

1. Key signature writing. Students from problem solving teaching method group have better understanding on key signature writing than students from common teaching method group in two matters. (1) Adding accidentals, including sharp, flat, natural, double sharp, double flat, onto the staff of G clef and F clef. Students from problem solving group recognize how the accidentals are added onto staff better than students from common teaching group. (2) Ordering of key signature, in sharp turn F# C# G# D# A# E# and B#, or in flat turn Bb Eb Ab Db Gb Cb and Fb. Students from problem solving group memorize and comprehend ordering and position of key signature more accurate than students from common teaching group. Students from common teaching group sometime make mistakes on ordering and positioning of key signature, such as position alternation, incomplete ordering on sharp and flat turn, etc.

2. Interval notation writing. Students from problem solving group have better comprehension on interval notation writing than students from common teaching group. In common teaching method, students recognize interval structure from scale and key sig-

nature. This results in several incorrectness and inaccuracy of interval notation writing by students with lack of understanding of scale; because interval characteristics sensitively depend on every single note. On the other hand, students from problem solving group have difference concept on interval notation writing. They get interval characteristic from distance of sound by mathematically counting from one note to another; illustrated as, keyboard of piano that has semi-tone and full-tone. This causes less incorrectness if students count the sound distance up as plus sign (+) and down as minus sign (-) in each interval.

3. Correctness of notation signal writing. Students from problem solving group have better comprehension on notation signal writing than students from common teaching group. This is caused by idea of sign adding to music notation including sharp, flat, etc. Students from problem solving group mathematically thought on notation distance up and down as plus and minus sign, resulting in less incorrectness and uncomplicated thinking process. For example, sharp sign is substituted with plus sign. In contrast, thinking process of common teaching group sometime causes inaccuracy on enharmonic note; note with same pitch but varied names. For instance, half-tone raised up of B can be unsuitable written as C instead of B#. Thus, problem solving method can effectively reduce this kind of mistake for notation signal writing.

4. Interval inversion writing. Students from problem solving group have better comprehension on interval inversion than students from common teaching group. For interval inversion writing, learners need to develop fine understanding in normal interval notation writing before it is inverted. Then, the learners can find the correct interval inversion. This shows that if the students do mistakes in key signature, interval distance, and/or notation signal including sharp and flat, the form of interval inversion will be also wrong. It is found that students from problem solv-

ing group do less mistakes on key signature, interval distance, and/or notation signal writing than students from common teaching group.

5. Accuracy of interval classification. Students from problem solving group have better comprehension on accuracy of interval classification than students from common teaching group. Students from problem solving group classify the interval by mathematically counting the distance of semi-tones and full-tones like it is on piano keyboard; plus and minus sign are utilized as up and down tone respectively. While, students from common teaching group classify the interval with scale and key signature concept which cause more incorrectness and complication.

According to five-topic research results of music theory learning of interval chapter, Tawashchai Narkwong (2000: 101) stated in mention of Zoltan Kodaly that American music teachers firstly know only some of Kodaly's teaching strategy, and they are impressed with the "signal" that was operated before current notation style is applied. During the problem analysis stage of problem solving method, teachers will let students find answer by themselves in a group brain storming to get final concept of the group and then bring it back to learning conclusion. In this research, students from problem solving group get concept of mathematical signal, plus sign (+) and minus sign (-), to generate and find answer of intervals. This signal creation agree with VARK learning method with Fleming and Baune (2006) mentioned that signals (+, -) are learning process constructed with vision that is the first learning sense of human influencing for aural, reading, and kinesthetic learning. Consequently, problem solving method is a learning manner that encourage learner to participate with group brain storming for the outcome concept of the group. This is corresponded with Grasha and Riechmann (1974) stating that participation learning promotes learners to be interesting in knowledge content of subject with enjoyable sentiment.

References

Fleming, N. and Baume, D. (2006). Learning Styles Again: VARKing up the right tree!. Educational Development, SEDA Ltd, Issue 7. 4, Nov. 2006: 4-7.

Grasha, A. and Riechmann, S. (1974). A rational approach to developing and assessing the construct validity of a student learning styles instrument. USA: Journal of Psychology.

Kitti Rattanarangsri. (2007). Teaching Method. Free academic document number 04/2007, academic office, Siam Technology School.

Nattcha Sotiyanurak. (2002). Music Theory. Bangkok: University of Chulalongkorn.

Tawashchai Narkwong, T. (2000). Music Teaching for Children. Bangkok: Kasetsart University.

Further Readings

Armarak, S. (1999). Basis of Western Music Theory. Bangkok: Odian Store.

Barbe, W. B. and Swassing, R. H. (1979). Teaching Through Modality Strengths: Concepts and Practices. USA: Zaner-Bloser, Inc.

Bogue, E. G. (1974). Variable in Effective Instruction. USA: Improving College and University Teaching.

Chaowaratana, C. and Jirasarntithum, J. (2007). Development of Learning and Teaching Method of Western Music with Multi Media. Master Thesis of Art. (Western Music). Faculty of Fine Arts, Tunyaburi Technology University.

Cronbach, Lee J. (1970). Essential of Psychological Testing. New York: Harper & Row.

Darnsakol, N. (2000). Primary of Music Theory. Bangkok: Odian Store.

Dunn, R and Dunn, K. (1978). Teaching student through their individual learning styles. USA: Prentice-Hall.

Dunn, R. & Griggs, S. A. & Olson, J. & Gorman, B. S. and Beasley, M. (1995). A Meta-Analytic Validation of the Dunn and Dunn Model of Learning-Style Preferences. Journal of Educational Research. 88(6), 353-362.

Eiszler, C. F. (1986). Perceptual preferences as an aspect of adolescent learning styles. Education, 103 (3), 231-242.

Felder, R. M. (1996). Matters of Style. ASEE Prism, 6(4), 18-23.

Fleming, N. D. and Mills, C. (1992). Not Another Inventory, Rather a Catalyst for Reflection. To Improve the Academy, Vol.11, 1992: 137-149.

Gagne, R. M. (1977). The Conditions of Learning. New York: Holt Rinehart and Winston.

Gardner, H. (1995). Leading Minds - An anatomy of leadership. London: Harpers Collins.

Garry, R. and Kingley, H. L. (1970). The Nature and Conditions of Learning. New Jersey: Prince Hall Inc.

Griggs, S. A. (1991). Learning styles counseling. Ann Arbor, MI: ERIC Counseling and Personnel Services Clearing House, University of Michigan.

Hilgard, E. R. and Bower, G. H. (1966). Theories of Learning. USA: Meredith Publishing Company.

James Brown, Murray. (1989). Theory of Music Workbook. London: Trinity College of Music.

Julsaweak, P. (2007). Development of Western Music Notation Learning with Melodeon Practicing Skill for Grade 6 Students, Bannongkaew School. Master Thesis of Education (Curriculum and Pedagogue), Graduate School, Bureerum University.

Jutarop, M. (1996). Teaching and Learning Psychology. Bangkok: Thipayawisut.

Kaemanee, T. (2002). Teaching Science: Knowledge of Effective Learning Methodology. Bangkok: University of Chulalongkorn.

Kaemanee, T. (2008). Learning Style - Teaching Style. Bangkok: University of Chulalongkorn.

Kaewkerd, S. (2007). Development of Learning Outcome and Group Assignment of Thai Traditional Music Subject 1 (S31101) with Co-Learning of Grade-Seven Students, Bangpaepatomwittaya, Second Rajchaburee Educational Office. Master Thesis of Pedagogic. Graduate School, Rajchapat Moobanjombeung University.

Kagan, M. and Sigle. (1974). Psychological Concepts in the Classroom. New York: Harper & Row.

Keefe, J. W. (1984). Instruction Leadership Handbook. USA: National Association of Secondary School Principals.

Keefe, J. W. (1991). Learning style: Cognitive and thinking skills. USA: National Association of Secondary School Principals.

Koawtrakol, S. (2009). Education Psycology. Bangkok: University of Chulalongkorn.

Kolb, D. A. & Rubin, I. M. and Osland, J. S. (1992). Organizational Behavior. USA: Prentice-Hall.

Kolb, D. A. (1985). Learning Style Inventory: Self-Scoring Test and Interpretation Booklet. Boston: McBer and Company.

Krejcie, Robert V. and Morgam, Earyle W. (1970). Educational and Psychological Measurement. New York: Minnesota University.

Kunaporn, P. (2013). Yonisomanasikarn- Buddhists' Thought. Bangkok: Active Print Company Limited

Kunthonbudra, J. (2007). Research for new generation. Bangkok: Sathathumic Company Limited.

McCarthy, B. (1980). The 4 MAT System: Teaching to learning styles with right/left mode techniques. USA: Sage Publications, Inc.

Moran, A. (1991). What can learning Style Research Learn from Cognitive Psychology. Educational Psychology, 11 (3 & 4), 239-245.

Myers, I. (1978). Myers-Briggs Type Indicator. USA: Consulting Psychologists Press.

Porka, P. (1999). Development of Teaching Material of Basic Music Theory in Western Music with Recorder Practicing. In the Primary Teacher of Ratjapat Institute. Master Thesis of Art (Music Education). Graduate School, Mahidol University.

Problem solving method. (On line). Available from internet, http://sixzoda.wordpress.com. Accessed November 15, 2012.

Pumin, P. (2008). Learning Outcome Development for Western Music Notation (Cord) with Problem Solving Method. Research report (Faculty of Fine Arts Financial Annual Report 2007), Srinakharinwirot University.

Ramsud, P. (1985). Learning Psychology. Bangkok: Chareankit.

Reiff, J. C. (1992). Learning styles. Washington DC: National Education Association.

Rotjanatrakol, S. (2006). Essential Efficiency Study of Teaching Administration with Children-Center Teaching Method, Bachelor Degree of Music: For Ratjapat Universities in Lower North Thailand. Research Report Ratjapat Phiboonsongkarm University.

Saiyod, L. and Saiyod, A. (2005). Educational Research Technique. Bangkok: Sureewiyasarn.

Secretary Office of Educational Congress. (2009). Education Renovation Suggestion on Second Decade 2009 - 2018. Bangkok: Prikwarn Graphic Company Limited.

Sujaritchan, D. (2006). Comparison of Music Learning Outcome in Basic Music Notation Reading of Grade 3 students who Learn Kodai's Method and Normal Method. Master Thesis of Curriculum and Pedagogue. Graduate School, Ratjapat Thepsatri University.

Sukhothaithumathirat University. (1997). Teaching Innovation. Bangkok: Sukhothaithumathirat University.

Sukpaet, P. (2009). Study of Outcome and Durability of Learning in Video Teaching of Music Elements for Grade 8 Students. Master Thesis of Education (Education Technology and Material). Graduate School, Ratjapat Chankasem University.

Sutajit, N. (2001). Behavior of Music Teaching. Bangkok: University of Chulalongkorn.

Unkaew, S. (1995). Practical Music Theory. Bangkok: Jun Publishing.

Wangsaptavee, Y. (2001). Multimedia Computer to Positive Teaching Stimulation in Complication of Extra Class of Western Music, Notation Expansion Chapter, Grade 3 Students. Master Thesis of Education (Special Education). Graduate School. Srinakharinwirot University.

Williams, D. E. Parry. (1975). A Music Course for Students. London: Compton Printing Ltd.

Wisawatheeranon, S. (2001). Learner-Center Teaching Model: Concept, Method and Technique. Bangkok: The Master Group Management.

Witkin, H. A. and Goodenough, D. R. (1981). Cognitive styles: Essence and origins. New York: International University Press Inc.

Witkin, H. A., Moore, C. A., Goodenough, D. R. & Cox, P. W. (1977). Field-dependent and field-independent cognitive styles and their educational implications. Review of Educational Research, 47: 1-64.

Wongsawadee, R. (2010). Learning Outcome Comparison of Thai Traditional Music Ensemble with Computer Learning Media. Master Thesis of Education (Education Technology and Media). Graduate School, Ratjapat Chankasem University.