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Editor's Note: Gilbert Allan N. Dispo is the principal author of this article. He served as the faculty mentor for a group of student researchers, who are contributors as co-authors.

Abstract

When properly integrated into learning experiences, music technology can help improve students' musical competency. In particular, notation software instructional modules have proven to enhance the competency of would-be music educators. In this experimental study, researchers administered a peer software tutorial to Filipino pre-service music teachers in order to determine whether or not using notation software enhanced their rhythmic, melodic, or harmonic competencies. Participants who received peer instruction demonstrated significant improvement in overall musical competency after treatment, while the control group did not show significant improvement. Results of this study indicate that peer software tutorials may improve pre-service music teachers' musical competency.

Keywords: music competence, music-making technology, technology in music education

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In the Philippines, music instruction is considered challenging given vague guidelines under the Basic Education Curriculum (BEC). In 2002, the BEC integrated music with other Makabayan subjects like Social Studies, Visual Arts, and Physical Education, Technology and Home Economics, and Values Education (Wong, 2002). After a decade of teaching according to the Basic Education Curriculum, Filipino music teachers experienced a disconnect between students' musical skills and knowledge and the requirements of musical pedagogy (Dispo, 2017). The Department of Education addressed this issue in Memorandum Number 128, series 2006 which asked the Bureau of Secondary Education (BSE) to conduct training for teachers with no specialization in music and the other arts. The purpose of this training was to develop the knowledge, skills, and attitudes of teachers teaching Music, Arts, Physical Education and Health starting in school year 2006-2007 (Bacani, 2006) whose undergraduate courses did not align to music education. In their memo, the Department of Education confirmed that a large part of the total population of Filipino Music teachers do not have basic, necessary music skills and competencies. Many music teacher educators are looking for new ways to address this issue.

Literature Review

Rivadelo (2010) defines musical competency as capabilities which include knowledge, skills, and attitudes in the fundamentals of music (Dispo, 2015; Burdeva, 2005). Burdeva (2005) explained that teacher competency is an essential factor in helping students learn productively. Bhargava and Pathy (2007) added that teachers' competencies are paramount factors in teaching-learning systems. The importance of acquiring these competencies lies in the awareness of teacher's responsibility in mastering the subject itself, leading to productive learning outcomes (Bhargava et al., 2007). A lack of constant development and refinement of teacher competency may lead to inadequate teaching capability; the effectiveness of a teacher is measured out by the

capacity to demonstrate content-area competencies in and outside the classroom (Esquilin, 2004; Green, 2011).

Teachers are becoming more aware of resources that might address the need to improve students' learning experiences; one such resource is technology (Serra, 2005). Many think that technology has a profound effect on students' learning experiences (Esquilin, 2004). Himonides and Purves (2010) explained that different web-based tools and software could enhance students' musical skills and creativity (Charrissi & Rinta, 2014). Skinner's connectionist principle suggested that technology and instructional machines can be useful tools in making learning processes more meaningful (Akkoyunlu, 2002). Many schools and institutions seek out technologies to offer students a better quality of education. However, in the end, instruction should not only depend on these tools. It is still important to consider traditional instructional models alongside contemporary innovations (Buck, 2008).

Technologies can have undesirable consequences for Such factors may indicate a lack of motivation on the part of students, causing them to discontinue learning. Lack of exposure to the technology itself is another factor that hinders students' learning processes since some aspects of the software must be learned beforehand (Astafan, 2011; McPake, Plowman & Stephen, 2012).

In order for teachers to use technology effectively in the music classroom, they must engage in preparation and planning. Langol (2006) proposed that having equipment and software that supports curricular goals, being knowledgeable about equipment and software to be used, and having effective strategies that guide a person's use of technology all play significant roles in creating positive experiences for teachers and learners. Successful technology integration often requires teachers to re-think and re-tool their teaching methods (Langol, 2006; Serra, 2005).

Educators continue to look for innovations to improve education; technology is just one

aspect of these new educational reforms. Teachers also recognize that their peers influence students' learning. Peer tutorials have proven to be extremely useful because tutors engage with their peers in similar language. Studies show that peer tutorial programs lead to positive learning outcomes. Evans and Moore (2013) reported that interaction among peers help them to recognize their potential, come to know their standing among their peers and foster a community of learners. Tutees are not the sole beneficiaries of peer teaching; peer tutors themselves also learn through peer-teaching, mastering concepts through communicative transfer of information (Alpay, Cutler, Eisenbach & Field, 2009).

Synthesizing these perspectives on education, the researchers formulated a tutorial program that combines technology and a peer tutorial program, seeking to help pre-service Filipino music teachers acquire the basic music competency necessary in their field of specialization. This study used *Finale* 2014 to facilitate the peer tutorial program, one of the most trusted and widely used music notation software programs in the Philippines.

The purpose of this study was to determine if peer tutorials in *Finale* 2014 have a significant effect on pre-service music teachers' musical competencies. Specifically, it sought to address the following research questions: What is the level of musical competence of the pre-service music teachers in rhythm, melody, and harmony? Is there a significant difference between the pre-test and the post-test of these competencies?

Methodology

Materials and Methods

This study used pre-test and post-test questionnaires. Researchers administered the pre-test before treatment to evaluate participants' prior musical knowledge. They administered a

post-test to determine the performance of the respondents after treatment. The contents of the pre-test were the same as the post-test.

Weekly modules designed to identify specific objectives necessary to address learning goals and the targets of this study (i.e., non-specialist pre-service music teachers) comprised the peer tutorial program. Modules included discovery learning where respondents explored *Finale* 2014 on their own (control group) or with the guidance of the peer tutors (experimental group).

At the time of this study, researchers used the most recent update to the *Finale* software suite, *Finale* 2014. As compared to earlier versions, *Finale* 2014 offers some additional features, like musical instruments. The researchers administered all lectures for the program. Each participant used a laptop for the duration of the tutorial program, allowing for individualized instruction and assessment. The research team facilitated the tutorial program.

Development and Validation of the Peer-tutorial Program

The researchers based the peer tutorial program lessons on SMART (Specific, Measurable, Attainable, Realistic and Time-bound). To ensure its validity, relevance and consistency with the objectives, researchers consulted an external content-area expert from Saint Louis University School of Teacher Education. The tutorial modules were as follows: Module 1 – *Finale* 2014 Set-up Wizard and Simple Entry Tools, Module 2(a) – Rhythm, Module 2(b) – Melody, Module 3(a) Harmony – Major and Minor Keys, Module 3(b) – Harmony – Identifying Chords and Module 4 – Texture. Researchers also provided additional hand-outs to participants (Thompson, 2011).

Procedure

Astafan (2011) recommended that researchers provide an opportunity for respondents to become better acquainted with the software before the intervention activity in order to achieve a better result. In order to accommodate this recommendation, the study underwent five phases.

Phase I involved preparations for the pre-test, post-test, and the peer tutorial modules. Researchers adapted the questionnaire from Dispo (2017). They used the split-half method and Brown Prophecy correlation formula. To determine the reliability or internal consistency of the test, the computed reliability of the entire test was 0.96 (i.e., high reliability).

Phase II involved preparations for the peer-tutorial program and submission to university protocol. The Dean's Office of the School of Teacher Education in Saint Louis University permitted researchers to conduct this study on school premises. Researchers reserved a room in which to administer the peer tutorial program.

Phase III was an orientation to the peer tutorial and the nature of the study. Students enrolled in MAPEH 10 - Integrated Music Theory participated in the orientation, where researchers gave a short introduction of the software.

Following the orientation, researchers selected students to participate in the study. The selection was based on students' statuses as Saint Louis University students enrolled in MAPEH 10 and students' willingness to participate in the program. Researchers selected ten students out of 29 possible participants. They then split the group into two separate cohorts. One was the experimental group who would be participating on the *Finale* peer tutorial program, and the other was the control group who would be given the opportunity to discover the *Finale* notation software program but would not receive any intervention of the peer tutorial. Researchers used

random selection in this process. Afterward, they administered pre-test questionnaires to both groups.

Phase IV consisted of a four-week *Finale* peer tutorial program (in the case of the experimental group) or a four-week self-discovery of *Finale* (in the case of the control group). Participants completed one module per week. Based on individual availability, students attended tutorials and self-discovery sessions. The experimental group received individualized instruction, while researchers monitored the self-discovery sessions of the control group. The time utilized for both groups were the same. At the end, researchers administered a post-test questionnaire to both experimental and control groups. After giving the post-test, researchers evaluated and analyzed the results. This constituted Phase V of the study.

Sampling

As stated previously, participants for this study were students in the Bachelor of Science in Secondary Education (BSEd) majors in MAPEH (Music, Arts, Physical Education, and Health) at Saint Louis University - School of Teacher Education and Liberal Arts in Baguio City, Philippines who were enrolled in MAPEH 10 (Integrated Music Theory Subject). Since the study included technology, accessibility to laptop computers was a concern for the researchers and most especially for the respondents. Purposive criterion sampling was applied in this research to address this issue.

Respondents were chosen based on the following criteria:

a. The respondent-student is enrolled in MAPEH 10.

b. The respondent-student should have passed the Music 1 (Fundamentals of Music) course, as having basic knowledge of rudiments in music is an essential requirement in order to understand how the software.

c. The respondent-student should have their laptop.

At the outset, researchers informed students that their participation was voluntary and would not hinder or aid them in their MAPEH 10 course. In addition, there was no incentive for students to participate. It was all voluntary. Researchers treated data gathered from respondents confidentially.

Research Design

Researchers utilized an experimental design and a descriptive method in this study. The pre-test assessed the initial music competency level of respondents. Students in the experimental group and the control group took the pre-test and the post-test. The purpose of the test was to determine if there was a significant difference between peer tutorial and self-discovery approaches to enhancing respondents' basic music competencies.

Statistical tool

This study employed frequency count, percentages, and weighted mean for the statistical analysis of data. We used the t-test to identify if the peer tutorial had a significant effect on the basic musical skills of pre-service music teachers. Researchers interpreted results of the pretest for rhythmic, melodic and harmonic competency based on the following:

Table 1

Descriptive Equivalence and Interpretation of the Level of Musical Competence of the Pre-service Music Teachers

Statistical Limit	Descriptive Equivalence	Interpretation
0% - 20%	Poor (P)	Very Low Competence (VLC)
21% - 40%	Fair (F)	Low Competence (LC)
41% - 60%	Good (G)	Average Competence (AC)
61% - 80%	Very Good (VG)	High Competence (HC)
81% - 100%	Superior (S)	Very High Competence (VHC)

Results and Discussion

Learners are likely to encounter many transitions between learning experiences, further training, and continuing education. Competency-based perspectives seek to ensure that learners will attain significant combinations of knowledge, skills, and abilities that are considered relevant concerning the subject they are studying or preparing (Jones, Voorhees & Paulson, 2002). Applying such a perspective in music education, Johnson (2014) reiterated the relevance of music concepts; the skills and attitudes of pre-service music educators enable them to facilitate situations that help students express feelings, ideas and imaginations in music instruction. Ho and Law (2014) and Knowlton and Sharp (2012) support this view.

The Experimental Group

Appendix A presents the level of rhythmic, melodic, and harmonic musical competencies of the experimental group as measured by the pre-test and post-test. Findings regarding the level of musical competencies of the experimental group were as follows:

Rhythm. Kaimien (2010) defined rhythm as the pattern of musical movement through time. It is the arrangement of the relative durations of and accents on the notes of a melody, usually laid out into regular groups (bars) of beats, the first beat of each bar carrying the stress.

Respondents in the experimental group attained scores of 100% in objectives one and two as measured by their pre-test mean percentage (see Appendix A). This shows that student-respondents in the experimental group were confident identifying the heartbeat of music, and they could identify proper rhythmic patterns appropriate for given rhythmic notation. 60% of the respondents in the experimental group answered correctly for objective three. However, the respondents in the experimental group struggled in objectives four and five. The pre-test mean percentage indicates that no one got the correct answer for objective four, and only one got the

correct answer for objective five. After respondents in the experimental group participated in the peer tutorial program, their average mean percentage improved from 56% (average competence) to 76% (high competence). Though post-test results in objectives one and two yielded the same mean percentage as the pre-test, the 40% increase in objectives three, four and five carried the average mean percentage increase. The result shows that some of the participants were able to recognize these concepts after the peer-tutorial program.

Melody. Charlton and Hickok (2009) defined melody as a rhythmically organized sequence of single tones so related to one another as to make up a particular phrase or idea. It is the structure concerning the arrangement of single notes in succession.

The pre-test mean percentage (see Appendix A) reveals that the respondents of the experimental group had difficulty specifying the tonic note of a given key signature, as well as the prime melodic intervals from other intervals. One respondent out of five was able to correctly answer objectives two and three. However, results show that respondents understood the meaning of conjunct progression of notes in the fifth objective (percentage mean, 80%).

Results indicate that after participating in the peer tutorial program, respondents in the experimental group had very high competence in enumerating sol-fa syllables of the given notes in a melodic pattern using the movable do technique (see Appendix A). The experimental group also showed that they became highly competent in specifying the tonic note of given key signatures. Nonetheless, respondents still had difficulty specifying the prime melodic interval from other intervals. Two out of the five respondents got the correct answer. The results of the pre-test and post-test show that respondents' level of melodic musical competencies increased from 40% (low competence) to 68% (high competence).

Harmony. Appendix A presents a summary of the experimental group's level of

harmonic music knowledge. Harmony, as stated by Kamien (2010), is the simultaneous combination of notes in a chord or any combination of sounds considered pleasing to the ear.

The experimental group's pre-test average mean percentage for harmony can be summarized as "average competence," with an average mean percentage of 60%. All respondents in the experimental group got the correct answer in objective two while two-thirds of them provided the correct answer for objectives one and three. Some respondents in the experimental group struggled in objectives four and five. Only two out of the five respondents provided the correct answer for these objectives.

Post-test results indicate that after the peer tutorial, the experimental group demonstrated "very high competence" for harmony. All respondents gave correct answers for objectives one, two, and three. Four out of the five respondents gave correct answers for the fifth objective. Some respondents had difficulty with objective four. Only two out of the five respondents provided the correct answer for this objective.

In summary, the experimental group's level of rhythmic, melodic, and harmonic musical competence significantly increased from 52% (pre-test grand mean percentage, with an interpretation of average competence) to 74.67% (post-test grand mean percentage, with an interpretation of high competence). The results suggest that respondents in the experimental group enhanced their music competencies after participation in the peer tutorial program.

The Control Group

Appendix B presents the level of rhythmic, melodic, and harmonic musical competencies of the control group as measured by the pre-test and post-test. Findings regarding the level of musical competencies of the control group are as follows:

Rhythm. The control group struggled in objectives two, four, and five; respondents did

not provide any correct answers for these objectives in the pre-test (see Appendix B). Objective one, which has a 80% pre-test mean percentage, was even higher on their post-test result. The results indicate that determining the heartbeat of music is a familiar concept to the control group. The control group achieved an 80% pre-test mean percentage for objective three, but scored lower during the post-test (60% post-test mean percentage). Results suggest that respondents may have been confused when figuring out the beat note of a given time signature. The control group's level of rhythmic musical competency (as measured by the pre-test and post-test) increased slightly from 32% (low competence) to 48% average (competence).

Melody. Control group respondents had difficulty in objective four; no one answered correctly during the pre-test or the post-test (see Appendix B). In objective one, only one respondent answered correctly during the pre-test and post-test. In objective two, no one provided the correct answer during the pre-test, and two answered correctly during the post-test. However, results also revealed that the control group showed high competence in objective five during the pre-test and even higher during the post-test. This result shows that the control group comprehended the meaning of conjunct progression of notes. All of them got the correct answer during the post-test.

The control group's level of melodic musical competency (as measured by the pre-test and post-test) rose from 24% (low competence) to 40% (low competence).

Harmony. Respondents from the control group gave very commendable performances on objectives one and two during the pre-test and the post-test. However, they had difficulty in objective three—no one gave the correct answer during the pre-test. This implies that respondents were familiar with concepts about musical texture, inversion, and basic chords. Yet, scores for identifying chord progression and descant music were extremely low even during the

post-test (see Appendix B). Respondents' pre-test average mean percentage for harmony declined from "high competence" (average mean percentage of 64%) to "average competence" (average mean percentage of 56%).

In summary, respondents' rhythmic, melodic, and harmonic musical competencies showed a slight increase from 40% pre-test grand mean percentage (low competence) to 48% post-test grand mean percentage (average competence).

Test of Difference between the Pre-test and the Post-test

Greher (2011) reiterated the significance of self-instructional modules with the aid of peer tutors as one of the most effective ways to enhance the knowledge and skills of music teachers. This view is supplemented by Schmidt (2010), who explored self-arranged teaching experiences of music teachers during their university education. Experiencing the value of learning within the community of their colleagues (Conway, 2012) enriched the learning. Tomlinson (2010) wrote that by collaborating with knowledgeable peers who engage in thoughtful discussions in music learning experiences, students assure all skills are being developed (De Vries, 2009).

Table 4

Test of Difference between the Pre-test and the Post-test of the Experimental Group

Mean Difference	P-Value	Level of Significance
-5 -3 -5 -4 -3		
-3.6	0.0009	0.05

Experimental Group

Table 4 indicates that the experimental group's level of musical competencies increased after they undertook the *Finale* peer tutorial program. Table 4 indicates a computed probability value of 0.0009; this p-value is lower than 0.05 level of significance, indicating a significant difference between the experimental groups' pre-test and the post-test. This result suggests that the *Finale* software peer tutorial program had a significant effect on the enhancement of would-be music teachers' musical competence. The *Finale* peer tutoring may have been very effective in reinforcing the basic music knowledge, skills and attitudes of the respondents in the experimental group by providing better insights coupled with scaffolding techniques from the peer tutors. Ebadi, Khatib, and Shabadi (2010) reiterated the perspective of Zone of Proximal Development (ZPD), which includes collaborative attempts—where learners learn together, internalize new concepts and psychological skills, and thus, achieve their objectives.

The Control Group

Table 5 reflects control group respondents' performances during the pre-test and the post-test. The p-value attained was higher than 0.05, which implies that there is no significant difference between the two tests. This may suggest that, because of the lack of a peer tutorial intervention, the control group was not able to better grasp the concepts in basic music skills during their 5-week time exposure to *Finale* software. Results suggest that interaction among peers is essential to help students identify their potential and determine their standing among their peers in a community of learners. Students learn with the influence of their peers (Blaine & Fels, 2010). The peer tutorial is proven to be extremely useful since tutors engage with their peers in similar language (Alpay, Cutler, Eisenbach & Field, 2009; Barrett, 2011).

Table 5

Test of Difference between the Pre-test and the Post-test of the Control Group

Mean Difference	P-Value	Level of Significance
-3		
-4		
0		
0		
1		
1.2	0.2835	0.05

Conclusions and Recommendations

The difference in the experimental group's pre-test and post-test scores indicate that, as a result of the peer tutorial program, respondents experienced an increased level of rhythmic, melodic, and harmonic competency.

The peer tutorial had a high impact because participants communicated their feelings and gave instant feedback to the tutor—an unlikely phenomenon in a traditional classroom setting. Thus, peer tutors assessed participants' specific needs in learning music concepts. This finding is also supported by research of Brush and Saye (2002), which summarized the exploration of hard and soft scaffolding for teachers and students using multimedia supported learning environments.

Another factor is the technology itself. This study followed the recommendation of Astafan (2011), where teachers must consider fore-knowledge on the software before going on to the module proper. The participants learned concepts properly because they already had an idea of how the software works. It follows that there was a significant difference between the experimental group's pre-test and the post-test. In contrast to Astafan's findings (2011), this study suggests that, with proper planning, guidance, and implementation of the program, technology can be a good avenue for learning music directly. In contrast with the results of the

experimental group, the control group who surveyed the *Finale* software program but did not undergo the intervention of peer tutorial had little success on the pre-test and the post-test.

In light of the above results and conclusions, researchers recommend the following:

1. Music notation software programs can be a good avenue for learning music and enhancing the musical knowledge, skills, and attitudes of the pre-service music teachers. However, such exposure to music technology should always be coupled with proper planning, guidance, and adequate time for scaffolding and implementation of the program.
2. Capability building programs integrating music technology may be conducted regularly to enhance pre-service music teachers' musical competencies continually.
3. Further research should identify the role of music technology and scaffolding in the holistic development of pre-service music teachers.

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Appendix A

Level of Musical Competence in Experimental group

Objective		Pre-test			Post-test		
		Mean (%)	**DE**	**I**	**Mean (%)**	**DE**	**I**
Rhythm	1. To determine the heartbeat of music.	100%	S	VHC	100%	S	VHC
	2. To identify the time signature appropriate to the given rhythmic pattern.	100%	S	VHC	100%	G	AC
	3. To figure out the beat note of a specific time signature.	60%	G	AC	100%	S	VHC
	4. To find out the property of rhythm that naturally tends to group notes in a measure.	0%	P	VLC	40%	F	LC
	5. To interpret the meaning of the lower number of the time signature.	20%	P	VLC	60%	G	AC
Average Mean		**56%**	**G**	**AC**	**72%**	**VG**	**HC**
Melody	1. To enumerate the so-fa syllables of the given notes in a measure using the movable do technique.	40%	F	LC	100%	S	VHC
	2. To specify the tonic note of a certain key signature	20%	P	VLC	80%	VG	HC
	3. To specify the prime melodic interval from other intervals.	20%	P	VLC	40%	F	LC
	4. To differentiate between major and minor scale.	40%	F	LC	60%	G	AC
	5. To understand the meaning of conjunct progression of notes.	80%	VG	HC	80%	G	AC
Average Mean		**40%**	**F**	**LC**	**68%**	**VG**	**HC**

Harmony	1. To figure out the root position from other inversions.	60%	G	AC	100%	S	VHC
	2. To emphasize the primary chords of a key signature.	100%	S	VHC	100%	S	VHC
	3. To differentiate the non-imitative polyphony.	60%	G	AC	100%	S	VHC
	4. To outline the chord progression of primary chords for a given melody that will be utilized as accompaniment.	40%	F	LC	40%	F	LC
	5. To classify round songs to what kinds of texture.	40%	F	LC	80%	VG	HC
Average Mean		**60%**	**G**	**AC**	**80%**	**S**	**VHC**
Grand Mean		**52%**	**G**	**AC**	**74.67%**	**VG**	**HC**

Legend:

VG =Very Good	***HV = High Competence***	***I = Interpretation***
G =Good	***AC = Average Competence***	
F = Fair	***LC = Low Competence***	
P = Poor	***VLC = Very Low Competence***	

Appendix B

Level of Musical Competence in Control Group

Objective		Pre-test			Post-test		
		Mean (%)	**DE**	**I**	**Mean (%)**	**DE**	**I**
Rhythm	1. To determine the heartbeat of music.	80%	VG	HC	100%	S	VHC
	2. To identify the time signature appropriate to the given rhythmic pattern.	0%	P	VLC	80%	VG	HC
	3. To figure out the beat note of a specific time signature.	80%	VG	HC	60%	G	AC
	4. To find out the property of rhythm that naturally tends to group notes in a measure.	0%	P	VLC	0%	P	VLC
	5. To interpret the meaning of the lower number of the time signature.	0%	P	VLC	0%	P	VLC
Average Mean		**32%**	**F**	**LC**	**48%**	**G**	**AC**
Melody	1. To enumerate the so-fa syllables of the given notes in a measure using the movable do technique.	20%	P	VLC	20%	P	VLC
	2. To specify the tonic note of a particular key signature	0%	P	VLC	40%	F	LC
	3. To specify the prime melodic interval from other intervals.	20%	F	LC	40%	F	LC
	4. To differentiate between major and minor scale.	0%	P	VLC	0%	P	VLC
	5. To understand the meaning of conjunct progression of notes.	80%	VG	HC	100%	S	VHC
Average Mean		**24%**	**F**	**LC**	**40%**	**F**	**LC**
Harmony	1. To figure out the root position from other inversions.	100%	S	VHC	80%	VG	HC
	2. To emphasize the primary chords of a key signature.	100%	S	VHC	100%	S	VHC

3. To differentiate the non-imitative polyphony.	0%	P	VLC	20%	P	VLC
4. To outline the chord progression of primary chords for a given melody that will be an accompaniment.	40%	F	LC	20%	P	VLC
5. To classify round songs to what kinds of texture.	80%	VG	HC	60%	G	AC
Average Mean	**64%**	**VG**	**HC**	**56%**	**G**	**AC**
Grand Mean	**40%**	**F**	**LC**	**48%**	**G**	**AC**

Legend:

S = Superior	***VHC = Very High Competence***	***DE = Descriptive Equivalence***
VG =Very Good	***HV = High Competence***	***I = Interpretation***
G =Good	***AC = Average Competence***	
F = Fair	***LC = Low Competence***	
P = Poor	***VLC = Very Low Competence***	