Construction of the Teaching Metaphors Scale

By
RICARDO MANUEL T. AGUADO
TIMOTHY JOSEPH O. MORAN

De La Salle University, Manila, Philippines

The objective of the study was to construct a teaching metaphors scale. Teaching metaphors that were classified by Alger (2009) has six dimensions that are either teacher-centered or student-centered. The test consists of 120 items with six subscales, which are "teaching is guiding", "teaching is nurturing", "teaching is molding", "teaching is transmitting", "teaching is providing tools" and "teaching is engaging in community". The instrument constructed by the researchers is a 4-point Likert scale that was used to measure teachers' teaching metaphors and use it as a guide in their teaching. There were 10 items constructed in each teaching metaphors based on the dimensions by Alger (2009). The initial item was administered to 150 teachers from different parts of Metro Manila. The exploratory factor analysis was used to determine if the same dimensions from Alger (2009) will be extracted. The reliability of the scale was determined using Cronbach's alpha. After the analysis, items with low factor loadings were removed. The new form was administered again to 500 teachers to confirm the factors arrived at. Results show that the teaching metaphors scale has different factors from the teaching metaphors identified by Alger (2009), the factors of the scale were intercorrelated and found to be reliable.

Teachers have different beliefs of what teaching is. Their different beliefs about the nature of teaching is called teaching metaphors. Metaphors structure our part of thinking, which are perceptions, thoughts and actions (Saban, Kocbeker, & Saban, 2007). There are different conceptions of teaching metaphors from different studies, one example of a teaching metaphors in teaching mathematics includes "mathematics as a language", "mathematics as a toolkit", "mathematics as a journey" and "mathematics as a structure" (Noyes, 2006); another example are the two metaphors, which are "education as production" and "education as cure" (Cook-Sather, 2003, as cited in Saban, Kocbeker & Saban, 2007). In addition, Martinez, Sauleda, and Huber (2001) said that teacher's types of metaphors are behaviorist, cognitive, and socio-historic. Alger's

(2009) teaching metaphors dimensions had four teacher-centered metaphors, which are teaching is guiding, teaching is nurturing, teaching is molding, teaching is molding, teaching is transmitting, and two student-centered metaphors, which are teaching is providing tools and teaching is engaging in community.

There are different versions of teaching metaphors because different methods were used to arrive with them across different studies (Alger, 2009; Martinez, Sauleda & Huber, 2001; Noyes, 2006; Saban, Kocbeker & Saban, 2007). In the study by Alger (2009), he used the on-line survey method sent via e-mail to southwestern high school district teachers. She asked the teachers to analyze the metaphors in line with the role of the teacher, the learners, and teaching and learning before choosing one that best characterizes their conception of teaching. Likewise, Saban, Kocbeker, and Saban (2006) and Saban, Kocbeker & Saban (2007) used the survey method by completing the statement "A teacher is like…because…". They analyzed the themes and arrived with a different set of teaching metaphors. Morever, Martinez, Sauleda, and Huber (2001) conducted a group discussion about teachers' and pre-service teachers' metaphors of how students learn. In the same way, Noyes (2006) required the students of secondary school mathematics teacher education course to submit an assignment regarding their starting position as teachers. To determine the teaching metaphors, they are instructed to write about their experiences of learning mathematics, both at school and in their lives, about teaching, and about how they understand the nature of mathematics. Leavy, McSorley, and Bote (2007) engaged pre-service teachers in metaphor construction activities in one whole semester. Every week, the participants submitted reflective journals, attend to focus group discussions and thinking about their teaching and learning beliefs by recalling their microteaching experiences.

There is a need to construct a scale that measures teaching metaphors because of the following reasons: (1) Previous studies only identified the different types of teaching metaphors. Having a scale helps identify specific teaching metaphors through behavioral indices provided. (2) There is an absence of teaching metaphor scales in published researches. (3) Previous studies have been conducted about teaching metaphors mostly using qualitative analysis and interview methods. The researchers will use a quantitative way of measuring teaching metaphors. (4) The teachers will not only identify their specific teaching metaphor but will also identify other teaching metaphors that they may posses as well. It justifies the researchers to construct a teaching metaphors scale given the following reasons.

The framework by Alger (2009) was used in constructing a teaching metaphors scale. Alger (2009) identified six teaching and learning metaphors. She classified the six teaching metaphors under teacher-centered and student-centered: Guiding, nurturing, molding, and transmitting falls under teacher-centered metaphors, while the student centered are providing tools and engaging in community to construct his or her own knowledge, or engaging in community such that teachers and students are constructing knowledge together. Grossman and Stololsky (1995), as cited in Alger (2009), said that the common culture with secondary teachers teaching the same subject and the same school matter share the same beliefs that could help characterize the possibilities on how teachers perceive their work and present situations. Ben-Peretz, Mendelson, and Kron (2003) and Fisher and Grady (1998), as

cited in Alger (2009), showed that teachers who share the same environment, they most likely share similar metaphors. In addition, Alger (2009) said that although teachers may share the same environment, they do not share similar conceptions of teaching. 80% of the teachers are reported to have teacher-centered conceptual metaphors while newer teachers have student-centered conceptual metaphors.

The items used in the textual descriptions served as the researcher's basis for writing a teaching metaphors scale (see Table 1 for the textual description). The teaching metaphors by Alger (2009) were chosen because his model of teaching metaphor dimensions were a product of all studies conducted about teacher metaphor for the last two decades. In addition, Alger's (2009) framework is the most recent that studied the construction of teaching metaphors.

Table 1
Teaching Metaphors by Alger (2009) and the Textual Descriptions

Teaching metaphors	Textual Description
1. Teaching is guiding (teaching-centered)	I see myself leading my students on a treasure hunt. I have a map that shows us the way. Sometimes the path is hard and sometimes it is easy, but it is always worth it when we get to the end.
2. Teaching is nurturing (teaching-centered)	It is a sunny day. I see myself holding a watering can and carefully attending to my seedlings. I make sure that the soil, water, and climate are rich and right for each seedling so that each will develop and blossom.
3. Teaching is molding (teaching-centered)	I am seated at a potter's wheel with a lump of clay. I carefully mold the clay into a well shaped and beautiful vase. Sometimes it takes pushing and prodding to get the vase to develop.
4. Teaching is transmitting (teaching-centered)	I have a large sum of money, which I deposit into a series of accounts. The goal is to deposit as much money as I can into each account so that each account has a high balance.
5. Teaching is providing tools (student-centered)	I wear a large tool belt. As each worker constructs his or her house, I provide the builder with the tools he or she will need to be successful in completing the project.
6. Teaching is engaging in community (student-centered)	I am part of a community that is building a house. We collectively decided that we need a house and then we design and build it together. The textual description was placed because metaphors can have multiple meanings. The descriptions identified the teacher and the students' place in the metaphor.

In this section, the researchers will present the highlights on how previous studies arrived with different conceptions of teaching metaphors. A historical view how teaching metaphors are conceptualized is presented and the succeeding studies that followed, giving a clear explanation as we arrived with the present study.

The first concept of metaphors that was related in teaching metaphors was based on the work of Lakoff and Johnson (1980). They studied metaphor in order to fill the gaps which are the limited theories of metaphor and that the definition of a metaphor in a dictionary is based on language only. This theory of metaphor by Lakoff and Johnson (1980) had been the basis of other researchers as their theory of metaphor that is used to relate in teaching. He explained that as individuals, we seek out personal metaphors to highlight and make consistent what we have in common with someone else. These metaphors are made to be consistent to individuals' own pasts, present activities, dreams, hopes, and goals as well.

After the studies of Lakoff and Johnson (1980) on metaphor, there came more researches on metaphors were related with other variables. But after some time, Bullough (1992) tried to explore the relationship between curriculum and teaching development by conducting a case study with English teachers. He collected data from the one pre-service teacher's and one teacher's historical background, which includes memories with their classmates and personal metaphors. Results show that the difference in age and personal maturity are important factors in teacher development. This is due to past experience, personality, and context influence decision making that beginning teachers make as they negotiate a teaching role and adopt, adjust or create a program of study for their students.

Extending study of Bullough (1992), he teamed up with another researcher. Bullough and Stokes (1994) found out how personal metaphors assist in development of pre-service teachers' professional development. They explored on how metaphors guide the process of teachers' self-formation and self- exploration. They gathered data by collecting 22 pre-service teachers' life-histories and metaphors. Results show different metaphors of the pre-service teachers coming from their life experiences. The analysis of the results showed three different group themes of different teaching metaphors, which are change, loss of innocence and rhythm.

From seeing how metaphors help in teachers' development, Grant (1992) related metaphors and teaching by examining the sources of structural metaphors of three secondary teachers who construct meaning to their students. She used reanalysis based on narratives and interviews. Results show that the metaphors of teachers are rooted in personal and professional contexts. This explains how the teachers' metaphors are not described as abstract thoughts but as metaphors formed with personal and professional meaning. One case says that he could teach anything from tennis, history or even mathematics using his metaphor of game.

Teachers who teach in a specific subject were investigated by Chapman (1997) where she tried to look at the metaphors behind teaching problem solving in mathematics. She collected data through interviews and observations with three teachers on how they make sense of teaching problem solving. She collected teaching documents and recorded the interviews on tape. The interviews were guided by open-ended questions and a flexible interview approach to allow the teachers the freely share their own way of thinking. Results show that metaphors played significantly in giving meaning of how teachers taught problem solving. Another thing is that the teachers draw out their metaphors out of the conflicts they need to be solved out of their own contexts. It was also found out that letting students use their problem solving technique was more effective than following a problem solving format in the

text book. In this technique, the students incorporate more of their real-world, personal and school experiences in problem solving.

Martinez, Sauleda, and Huber (2001) summarized the previous studies by explaining how three domains of metaphors affect a teacher's teaching. First is behaviorist perspective where the teacher's role is described as transmitter or trainer of skills. Learner was seen as a recipient of knowledge that is likened to an empty slate or a container. Second is cognitive perspective where learning is defined as individual construction of knowledge. It focuses more on the students' notions of organization and elaboration of knowledge, active role in restructuring experiences and achieving conceptual coherence, understanding of theories and concepts, and the development of general skills, intrinsic motivation and transfer. In this perspective, the teacher's role is pictured as a facilitator and coach. Third is socio-cultural perspective where learning is seen as a participation in the activities in the social community. In this perspective, the classroom is seen as a community of practice and everyone participate in search of knowledge. They were able to find out these metaphors by starting out with a group discussion with teachers about their metaphors of learning. From each of the teachers' answers, they were put in one of the three categories.

After a year, Patton (2002) discussed in his study the effectiveness of teaching and training with metaphors. He showed the relevance of using metaphors by making something understandable to the students by connecting it to certain experiences and situations. He used this method to make portfolios more effective for evaluation and emphasis of the desired meaning.

From the previous literature that conducted qualitative interviews and theory development, another approach was used by Greeves (2005) where he conducted a workshop to show how the use of metaphors guides pre-service teachers' pedagogical theory and practice. She developed a metaphor-based activity called "The Butterfly Project" to seeing how they address students' diversities and demonstrate a constructivist approach to teaching. The activity started out by giving an instruction to the pre-service teachers to make and bring a butterfly to class. The pre-service teachers brought butterflies that vary in shapes, sizes, color and materials used. The teacher now presented her own butterfly's history and torn its wings in each episode that was presented. The teacher now discussed the pre-service teachers' difference in their butterfly's features. The pre-service teachers also described the story behind their butterflies in their given features.

A unique relation of a metaphor with teaching is explained by Breault (2006) where he related jazz improvisation and blues with teaching and the process of developing curriculum. Through literature reviews, he explained how teaching and methods in jazz and blues were related. To explain how they were related, he enumerated 4 categories, which are "Internal vs. External Complexity", "Intimidation and Respect", "Experience and Individuality" and "Expresion and content". In "internal vs. external complexity", he described how the thousand decisions that teachers make are related in the improvised chords that jazz players make in every song. In "intimidation and respect", how jazz music intimidates a novice musician is also likened to how a teacher's work discourages admiration and intimidation with teaching peers. "Experience and individuality" says that how jazz supports its

improvisations is through its rhythmic nature and dependence on primary chord, while blues was known as a solo flight throughout the history. In its relation to teaching, teachers view their jobs as an extended form of parenting that relied with personal experience and instincts. The last category, which is "expression and content", says that jazz players and blues players blend rhythms and harmonic structures among other musicians, and expression through their music forms great music. This is related to how teachers use their materials to communicate effectively with their students.

Related to Chapman's (1997) study on how teachers make sense out of problem solving, Noyes (2006) developed the concept of metaphor in teaching math. He found four dimensions of metaphors in teaching mathematics, which are "mathematics as structure", "mathematics as tool kit", "mathematics as journey" and "mathematics as language". Noyes (2006) found these dimensions by exploring on the pre-service mathematics teachers' beliefs on learning mathematics and teaching mathematics.

Using a qualitative method, Saban, Kocbeker and Saban (2006) tried to find out which metaphors do pre-service teachers use to describe what a teacher is, including what conceptual categories can be taken from the different metaphorical images and how do the themes vary across participants' program type and gender. A complementary study by Saban, Kocbeker and Saban (2007) says that teacher educators can use metaphor analysis to assist in examining teacher's values, beliefs and philosophies about teaching and learning. This brings to their explanation that Metaphors invite researchers to explore comparisons, notice similarities, and use a situation as an image of another.

Comparing two nationalities using the theory of Martinez, Sauleda and Huber (2001), Leavy, McSorley and Bote (2007) tried to found out how individuals construct their metaphors affects their beliefs about teaching and learning using Irish and American pre-service teachers as participants. They based their metaphor construction in the three domains attributed by metaphors by Martinez, Sauleda and Huber (2001). Leavy, McSorley and Bote (2007) found out that there is a high percentage in the behaviorist domain in both Irish and American pre-service teachers. But as the semester ends the percentage on constructivist domain the survey conducted had a high percentage on the behaviorist domain. They also found out that aside from the three domains identified by Martinez, Sauleda and Huber (2001), they found that there are still other domains that could be found.

Related to the findings of Leavy, McSorley and Bote (2007), Alger (2009) saw how metaphors of teaching and learning change over time. Oftentimes these metaphors are conventional, meaning that they are prevalent in the culture and their meaning is shared by the culture. Teachers' use of metaphorical language to describe and explain their beliefs about students, the teacher's role, and their profession is widespread (Munby, 1987; Tobin, 1990, as cited in Alger, 2009). Wideen, Mayer-Smith and Moon (1998), as cited in Alger (2009), found that change in teacher beliefs was resistant to short-term interventions. Six metaphors identified by Alger (2009) were acquired through literature reviews. In result, he developed a survey that in order to explore on teachers' metaphors when they started their pre-service program, while in the teaching profession and metaphors desired to operationalize. He asked the teachers to state which metaphors are most common in teaching and teachers.

Based on the literature reviews, the researchers saw the specific dimensions that will be used for the teaching metaphors scale which are results from subsequent studies from the last two to three decades. Previous literatures also strongly related metaphors in the teaching field. The researchers are now extending the study on teaching metaphors by creating a teaching metaphors scale. In this matter, there is a need to construct a teaching metaphors scale and introducing a different method of collecting metaphors through quantitative technique since previous studies used qualitative methods to collect teachers' and pre-service teachers' teaching metaphors.

The purpose of the study is to construct an instrument that will measure teaching metaphors specifically:

(1) Will the extracted factors in the study be the same with the dimensions proposed by Alger's (2009) study with six dimensions?
(2) Will the items be internally consistent?
(3) Will the factors of the teaching metaphor scale related to each other?

Method

Test Design

This instrument used a 4-point Likert scale ranging from 1, being strongly disagree to 4, being strongly agree. A high score indicates a high level of adherence to a certain teaching metaphor while a low score would indicates otherwise. The items are written for the six teaching metaphors dimensions of Alger (2009), which are teaching is guiding, teaching is nurturing, teaching is molding, teaching is transmitting, teaching is providing tools and teaching is engaging in community. A teaching metaphors questionnaire was answered by teachers from different schools. The teaching metaphors questionnaire aims to collect information based on the identified teaching metaphors by Alger (2009). The use of the instrument is to find the teachers' teaching metaphors and use it as a guide in daily teaching through activities, lectures and classroom management. In this matter, the instrument will not dictate what the teacher will do but will serve as basis for using the other five metaphors that they also have. In addition, the different classes that teachers handle and different students will help adjust and develop the other metaphors they possess.

Search for Content Domain

The teaching metaphor scale indicates the dimensions of teaching metaphors, which are teaching is guiding, teaching is nurturing, teaching is molding, teaching is transmitting, teaching is providing tools, and teaching is engaging in community. In order to see the teaching metaphor that the teacher possesses, the researchers administered the teaching metaphors scale.

Item Writing

The items for the teaching metaphors questionnaire were solely based from the literature reviews of the researchers. The 60 item questionnaire was based from the teaching metaphors of Alger (2009). Each dimension of teaching metaphors includes 10 items which were made by the researchers that has the elements of a good questionnaire should be: simple vocabulary, short as possible, includes all the key ideas and not misleading.

Item Review

Based from the survey, 60 items under six factors were constructed. The items were reviewed by experts in Educational Psychology and teaching assessments. The teaching metaphors questionnaire designed by the researchers was thoroughly checked on how they arrived to come up with their items and factors. The experts who checked the items in the questionnaire were given the teaching metaphors items together with the definitions of the each dimension. The item reviewers judged each item by checking whether it is relevant, not relevant, and needs revision. After the items were reviewed, the scale was administered to the target participants.

Scaling Technique

The instrument used is a 4-point Likert scale ranging from 1, being strongly disagree to 4, being strongly agree. A high score indicates a high level of adherence to a teaching metaphor dimension while low scores in other dimensions would indicate some metaphors that the teacher might posses.

Likert scale was used to attain teacher's teaching metaphors and this scale measures the opinion of teachers. This scale also measures the degree of disagreement and agreement according to the participants' opinions regarding the study. The scale was able to obtain the summated value of the participants' responses.

Procedure for Pretesting

The items in the scale were administered to 150 teachers. They were asked to answer the instrument in their own time and their own pace with a given deadline. This means that the teachers could answer the items during their free time. The teachers who were asked are teachers who teach in high school and college level whose age range from 20-35 years old and teaching within one to three years. The teachers will answer each item by putting 1 if they strongly disagree, 2 if they disagree, 3 if they agree and 4 if they strongly agree about the statements in the instrument.

After they complete the scale, the teachers were asked if they are still willing to answer the scale again next time for the pilot testing.

Reliability Analysis

In the data-analysis, the reliability of the test instrument was determined using Cronbach's alpha and interitem correlation. The 60 items were intercorrelated to see if the items written are consistent with each other.

The Cronbach's alpha was used to determine whether the items in the teaching metaphors scale are internally consistent. Cronbach's alpha was used as a measure of internal consistency and reliability. The researchers used Cronbach's alpha in order to know whether the Teaching Metaphors Questionnaire is internally consistent and reliable. Also it is recommended to use Cronbach's Alpha because the researchers used Likert scale which is a multiple choice type of test (1 if strongly disagree, 2 if disagree, 3 if agree and 4 if strongly agree).

Validity Analysis

Factor analysis determined if the dimensions of teaching metaphors by Alger (2009) could be the same in the present study. The analysis will indicate the items' factor loadings of .40 and above as acceptable. Also factor analysis examines the correlation between set of variables in order to identify groups of variables which are relatively homogeneous (Deikhoff, 1992). The number of factors was examined using the scree plot. After identifying variables with high intercorrelations, the researchers also measured underlying variables that were called factor scores and factor loadings. The good items that remained in the teaching metaphors scale was used for the pilot testing. The researchers also saw that there were other variables formed through the factor analysis and considered if the new variable formed could help improve the researchers' study.

Confirmatory factor analysis was used to assess the number of factors and the loading variables. CFA was used to investigate whether the established dimensionality and factor-loading pattern fits a new sample from the same population and fit for hypothesis testing. Factor correlations also show strengths of the association between factors. In addition, the researchers used fit index measures like Goodness of Fit Index (GFI), chi-square (χ^2) and Root Mean Square Error of Approximation (RMSEA). The GFI measured how the observed variance and covariance are related. The χ^2 was used to test the probability of getting the frequencies observed if the null hypothesis were true. The RMSEA will measure the amount of inconsistency per degree of freedom and will also find out the error of approximation in the teachers who answered the test. For GFI, a score of 0.90 is needed for it to be a good/accepted scale while for χ^2 a low value will show adequate goodness of fit. For RMSEA, a score of 0.05 is needed for it to be a good/accepted scale.

Procedure for Pilot Testing

For the pilot testing, another set of 500 teachers were requested to answer the researchers' teaching metaphors scale with the new set of items based on the factor analysis. They were asked to answer the instrument in their own time and their own

pace with a given deadline. This means that the teachers could answer the items during their free time. The teachers answered each item by putting 1 if they strongly disagree, 2 if they disagree, 3 if they agree and 4 if they strongly agree about the statements in the instrument. After they finish the test, the teachers were thanked for participating in our study.

Reliability Analysis

In the data-analysis, the reliability of the test instrument was determined again. The 120 items were intercorrelated and the factors' reliability was obtained once again using Cronbach's alpha.

Results

Phase 1

This section first presents the means, standard deviations, Cronbach's alpha, skewness, and kurtosis of the instrument created. The principal components analysis of the items of the teaching metaphors scale for further data reduction is also presented. Furthermore, the items that remained and their new dimensions are presented in this section.

Table 2
Means and Standard Deviation of Teaching Metaphor Instrument

Teaching Metaphor Dimension by Alger (2009)	*M*	*SD*	*N*	Cronbach's Alpha	*Skewness*	*Kurtosis*
Guiding	2.83	0.41	150	0.57	-0.28	0.61
Nurturing	2.77	0.39	150	0.54	-0.05	-0.36
Molding	2.67	0.40	150	0.51	0.22	-0.29
Transmitting	2.72	0.35	150	0.40	-0.23	-0.65
Providing Tools	2.75	0.41	150	0.55	0.12	-0.42
Engaging in Community	2.65	0.38	150	0.48	0.13	-0.25

Note: Means that score 1-1.5 is very low, 1.51-2 is low, 2.01-2.5 is moderately low, 2.51-3 is moderately high, 3.01-3.5 is high, and 3.51-4 is very high

The means scores obtained for each factor of the Teaching Metaphor scale were almost in the same level. The means of each of the factors of the Teaching Metaphor Scale fall under moderately high. The low values of standard deviation
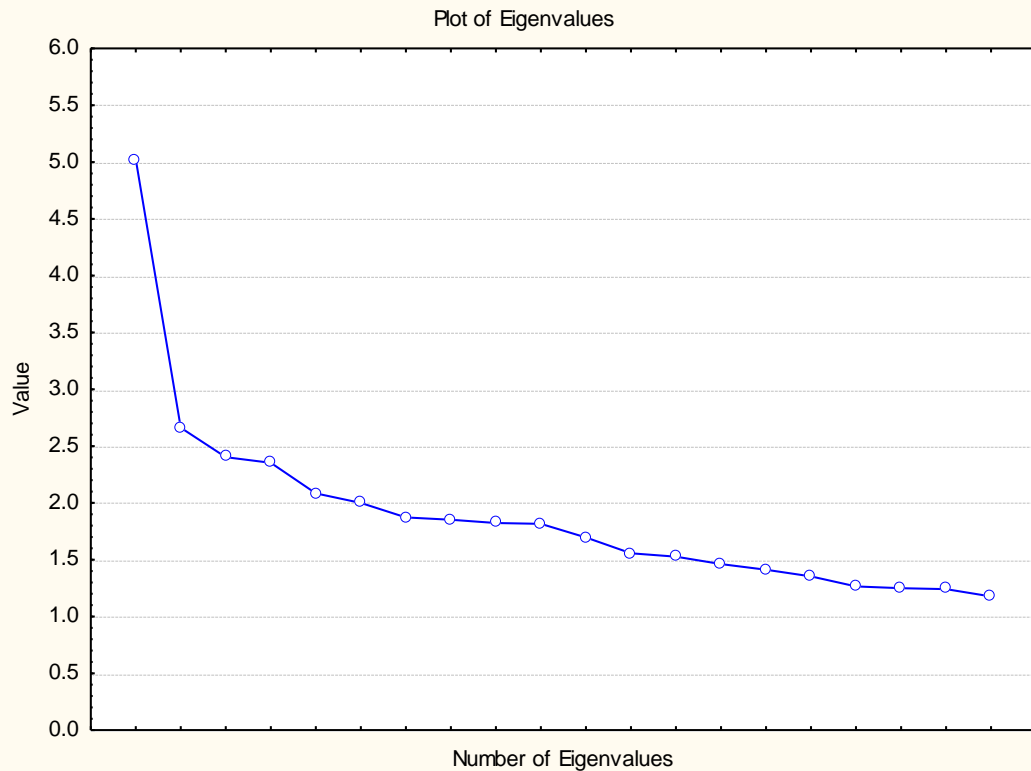
indicate that there is less variation of the scores of each Teaching Metaphor Scale. The Cronbach's Alpha of the whole test is 0.78, which means that the items in the test have high internal consistency. However, the Cronbach's Alpha of each dimension has lower internal consistency because the items for each dimension have only 10 items, which splits the consistency of the whole scale. The skewness of the test is typical of a normal distribution though it tends to be negatively skewed. The kurtosis of the scale is mostly negative except for the dimension "Teaching is Guiding", which indicate a relatively flat distribution.

The researchers were able to find that the 60 items loaded under four factors, which did not support Alger's (2009) six factors. The researchers used varimax rotation to see where the factors will load unlike in quartimax rotation where it tends to produce one general factor and has and contains smaller sub-factors. The Eigenvalues were assessed using screen plot, which showed that having all four factors account for a total variance of 3.92% (for the first factor total variance is 8.37%, for the second factor total variance is 4.44% and 4% for the third factor). Factors beyond the fourth were not considered because the total variance extracted are low and almost have the same Eigenvalues (for the fifth factor total variance is 3.47%, for the sixth factor total variance is 3.33%). Since the teaching metaphors instrument is reduced to four factors, a different dimension name was given to them. The new dimension name was based on the items that loaded on the following factors.

Table 3
Table of Eigen Values for the Teaching Metaphors Instrument
Eigenvalues Extraction: Principal Components

	Eigenvalue	% Total	Cumulative Eigenvalue	Cumulative %
1	5.02	8.37	5.02	8.37
2	2.66	4.44	7.69	12.81
3	2.4	4	10.09	16.81
4	2.35	3.92	12.44	20.73
5	2.08	3.47	14.52	24.21
6	2	3.33	16.52	27.54

Figure 1
Scree Plot of Eigenvalues of the Teaching Metaphors

Plot of Eigenvalues

Items with factor loadings of 0.40 and above were the ones that are accepted: 8 items loaded under the first factor, 5 items loaded for the second factor, 2 items loaded under the third factor, and 3 items loaded under fourth factor. The newly named dimension was as follows: Teaching as Choice-based, Teaching as a Stewardship, Teaching as a Part of a System, and Teaching as an Art. The researchers gave the first factor the name of "Teaching as Choice-based" because the items tell about the teacher's role as the one who leads the students to success by giving information on the right decisions while the students are given the freedom of choice (see table 3, example: A teacher is like a gasoline station that has many varieties). On the second factor, the researchers gave the name "Teaching as a Stewardship" because the items tell about how the teacher is an expert on the teaching field; equipping students with information that would aid students have a better grasp on the lesson. (See Table 4, example: A teacher is like a parent that sees to it that a child is properly guided). The third factor is given the name "Teaching as a Part of a System" because the items tell about how the student is involved in a system wherein he/she is needed in order for learning to work (See Table 5, example: Students are like batteries that need to be recharged). The last factor is given the name "Teaching as an Art" because the role of the students here is a raw material wherein the teacher and/or student are the ones who will help hand in hand to create a work of art (See Table 6, example: A student is like a wall that is painted with colors).

Table 3 to 6 shows the new dimension names and their factor loading scores. Out of the six factors by Alger (2009), there were a total of four factors that

remained. Two of these factors are teacher-centered metaphors and the other two factors are student-centered metaphors.

Table 4
Items and factor loadings of "Teaching as choice-based"

Items	Factor
1. A teacher is like a gasoline station that has many varieties.	0.43
2. A teacher is like toolbox that provides materials needed for building a house.	0.61
3. A teacher is like a chemical that are added to create materials.	0.47
4. Students are like critics that provide a commentary.	0.56
5. A teacher is like a platoon leader that encourages the soldiers to fight.	0.44
6. A teacher is like a newspaper that makes society aware of the events.	0.42
7. A student is like a candidate that chooses the right political party.	0.40

Table 4
Items and factor loadings of "Teaching as Stewardship"

Items	
1. A teacher is like a parent that sees to it that a child is properly guided.	0.45
2. A teacher is like a manual that helps users operate a product.	0.42
3. A student is like a train that runs on a rail track.	0.48
4. A student is like a tourist that needs guide in a new place.	0.63
5. A teacher is like a gardener that takes care of the little seedlings to ensure its proper growth.	0.54

Table 5
Items and factor loadings of "Teaching as a Part of a System"

Items	
1. Students are like batteries that need to be recharged.	0.49
2. Students are like ants that contribute in a colony.	0.50

Table 6
Items and factor loadings of "Teaching as an art"

Items	
1. A student is like a wall that is painted with colors.	0.65
2. A student is like hair that can be fixed when messy.	0.44
3. A teacher is like a wire that conducts electricity.	0.46

Phase 2

Phase 2 of the present study confirms the four factors of teaching metaphors (using a sample of N=500) obtained in phase 1. The items which loaded highly on the four new factors were administered to 500 teachers with the same criteria as to the first pilot testing. The means, standard deviations, Cronbach's alpha, skewness, and kurtosis of the four new teaching metaphors were obtained. The interitemcorrelation of the four new factors are also presented to test for its convergence. The four new factors of the teaching metaphors were confirmed using a four factor measurement model with the use CFA.

Table 7
Means and Standard Deviation of Teaching Metaphor Instrument

4 factor Teaching Metaphor	*M*	*SD*	*N*	Cronbach's Alpha	*Skewness*	*Kurtosis*
Teaching as Choice-based	2.71	0.39	500	0.56	0.55	0.26
Teaching as a Stewardship	2.74	0.44	500	0.51	0.44	0.09
Teaching as a System	2.68	0.54	500	0.30	0.16	0.31
Teaching as a Work of Art	2.65	0.51	500	0.33	0.28	0.34

Note: Means that score 1-1.5 is very low, 1.51-2 is low, 2.01-2.5 is moderately low, 2.51-3 is moderately high, 3.01-3.5 is high, and 3.51-4 is very high

The means scores obtained for the four new factors of Teaching Metaphor were almost in the same level (M=2.71, 2.74, 2.68, 2.65). The means of each of the four new factors of fall under moderately high. The low values of standard deviation indicate that there is less variation in the scores among the 500 cases. The Cronbach's Alpha of the whole test is 0.67, which means that the items in the test have high internal consistency. However, the Cronbach's Alpha of each dimension has lower internal consistency because the items for each dimension have only 7, 5, 2 and 3 items respectively. The skewness of the test is typical of a normal distribution though it tends to be positively skewed. The kurtosis of the scale is positive, which indicates a relatively peaked distribution.

The researchers established the relationship of the four new factors by testing its convergence.

Table 8
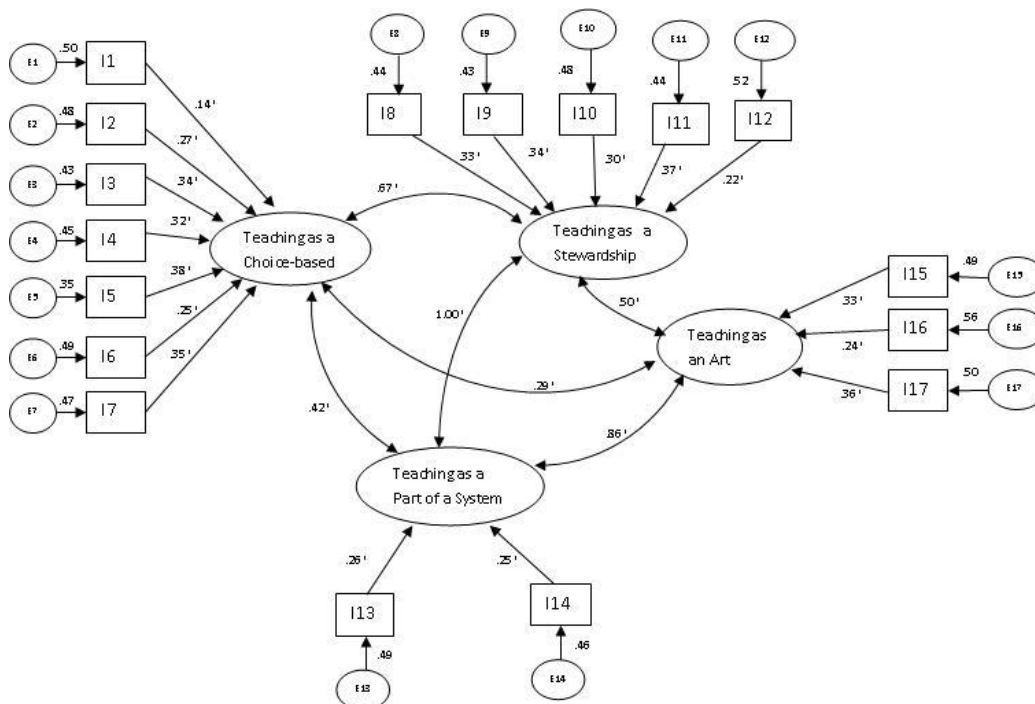*Intercorrelation of the Four Factors of the Teaching Metaphors*

	Choice-based	Stewardship	Part of a System	Art
Choice-based	---			
Stewardship	.35*	---		
Part of a System	.17*	.35*	---	
Art	.14*	.24*	.27*	---

*p < .05

Results shows that each factor of the teaching metaphor is significantly related with each other, p < .05 (See Table 8). The factors also show a positive relationship where there is an increase in one teaching metaphor, the others also significantly increase. The moderate correlation coefficients indicate that each factor is still distinct to each other due to less collinearity.

The four factors of the teaching metaphors were confirmed in a measurement model. The four factors of the teaching metaphors were structured as latent variables and their corresponding items as indicators. The four factors were tested if they are intercorrelated and at the same time their respective items as loading to that factor. The goodness of fit of the mode was also tested if it is representative of the sample.

Figure 3
A Four Factor Structure of Teaching Metaphor

The measurement model in figure 2 shows that the four factors have a significant relationship. This means that an increase in variance in one teaching metaphor significantly increases the others. Each factor has their own respective indicators that show significant path with their own factors. This means that the items under each of the respective factors really belong to their respective teaching metaphor.

The model is tested for goodness of fit using the chi-square (χ^2), Goodness of Fit Index (GFI) and Root Mean Square Error of Approximation. The chi-square indicates a model of a bad fit (χ^2=332.70, df=113, χ^2/df=2.94) but the other fit indices show better fit. The model showed adequate goodness of fit, as indicated by the GFI (.93), which is high and the RMSEA is satisfactory (0.05). These indicate that the sample of 500 represents the path model well.

Discussion

The results present study showed a new model of teaching metaphors for Filipino teachers. This is reflected by the first and second pilot testing. The 150 participants that answered prove that teachers here in the Philippines are both teacher-centered and student-centered since what they answer reflects their conception of teaching.

The first factor, "Teaching as Choice-based", although student has a choice in whether he/she will choose to follow the teacher, the teacher is still the one who give options/choices to the students on how one student could learn. Like the item that tells about tools in this category "A teacher is like a tool box that provides materials needed for building a house", the students have a variety of tools to use to build a house but it would be the students' choice on how they will be using these tools to build the house. An example here is letting the students make a kite with materials provided by the teacher. The kite that the students will make will vary since there are different choices that the students make. Although given certain materials, the teacher is still the one who gives options/choices to the students on how one student could make the kite. The reason for labeling it as a teacher-centered metaphor is because five out of seven items tell about the importance and the things that the teacher does and how they aid in the need of the student. On the other hand, two out of seven items tell about what the student can do with different choices to choose from.

The second factor, "Teaching as a Stewardship" the teacher serves as an expert on the teaching field; equipping students with information that would aid students have a better grasp on the lesson. The teacher plays the role of a steward that would help you and provide assistance in times dire need. Teachers conduct lessons in a way the students will understand them better by providing them examples related to the students' lives. Given the freedom to do what they will, the teacher will keep them under surveillance, as to keep the students in line. In this factor, three items tell about how the teacher takes action in maintaining what the students need. An example here is conducting a lesson and in order to help the students understand the lesson more, the teacher will provide more examples that would relate to the students lives. By doing so, this will make the students feel the

relevance of the lesson in their lives. In this factor, three items tell about how the teacher takes the action in providing for what the students need.

The third factor, "Teaching as a Part of a System" is all about how the teachers teach their students information or knowledge that will help them be the productive part of society; the students will be working and will be using what is taught to them by their teachers to help them function. The students will acquire the recommended skills and perform their best to be able to contribute their abilities and to share their knowledge to the world that we refer to as the system. Like the ants who contribute to their colonies, the students will become those ants who will be giving back to the system with their own insights and opinions that could help themselves and others. This is related to one of the three domains of metaphors by Martinez, Sauleda, and Huber (2001), which is the cognitive perspective. This is because the student here plays an active role in restructuring experiences and achieving conceptual coherence, understanding of theories and concepts, and the development of general skills. The teacher's role in this perspective is a facilitator or coach.

Lastly is the fourth factor, "Teaching as an Art" wherein the students are like raw materials that are to be molded and created with the help of both the teacher and the students to create a beautiful work of art. This is just like the "Butterfly Project" of Greeves (2005) where the teacher asked the students to make their own butterflies and resulted in different kinds of butterflies. The teacher here assigned the students to build butterfly out of any materials. This resulted in making different kinds of butterflies varying in shapes, sizes and materials used in creating the butterfly. As seen in this factor, the teacher lets the students are the ones who organize their thoughts and ideas.

The first pilot test proves that teachers here in the Philippines are teacher-centered and at the same time student centered. This is because the factors have two teacher-centered metaphors and two student-centered metaphors. This also proves that Alger's teaching metaphors are different from the teaching metaphors of the researchers. Although Alger's (2009) dimensions are the same when it comes to the number of factors in the student-centered dimension, the overall factors of the whole scale is less than the factors of Alger (2009). This states that teachers in the West have different structure of thinking compared to the Filipinos because as Saban, Kocbeker and Saban, (2007) said that metaphors structure our part of thinking, which are perceptions, thoughts and actions.

The first pilot test also proves that the education system here in the Philippines is still developing student-centered teaching. This is seen from the lower items acquired from the student-centered metaphors than the teacher-centered metaphors. This implies that teachers here in the Philippines view teaching more as the teacher who contribute more to the learning of the students. Having the teacher contribute more to the students' learning does not mean that the students are inactive since there are some items in the two factors that have student-centered metaphors.

The 500 teachers in the second pilot test validated the four factor structure teaching metaphors scale, which is seen in the confirmatory factor analysis conducted by the researchers. The factors and their respective indicators are all significant to each other. This means that when one factor goes high, the others will go high as

well. Although the factors have low correlation, this implies that each teaching metaphors are distinct to each other. Being distinct means that they all fall under the category of teaching metaphors but their characteristics are all different from each other.

The means of the four factors fell to the moderately high score which is 2.5-3. This means that the teachers answer somewhat high and tends to answer in the middle. The standard deviation also states that the answers of the teachers are not far from each other.

The acceptable fit indices from the Goodness of Fit Index (GFI) and Root Mean Square Error of Approximation (RMSEA) states that the teaching metaphors scale is reliable to measure teaching metaphors. This is because the GFI show strong relationship between the variance and covariance. The RMSEA, on the other hand, measured that there is less inconsistency per degree of freedom and less error of approximation in the teachers who answered the test.

Having a scale that is internally consistent, the teaching metaphors scale is reliable to measure a teacher's teaching metaphor and other metaphors that he/she may have. The teaching metaphors scale can be an answer to the question in their head concerning why they are good at a certain part of teaching. By having the teacher know what teaching metaphor he/she may have, it will enlighten the teacher in his/her conception. This is because not all teachers are aware of their teaching metaphors. For example, a teacher got high results in the dimension, "Teaching as a Choice", one way where he/she can be effective is by improving that skill in that certain factor. It is something like focusing on one strength and use it as an advantage in his/her teaching skills. Another way is that knowing that the teacher is low on other dimensions; he/she can try to improve on those other dimensions in order to be more effective in making lesson plans and class performance.

The following conclusions were made based upon the review of data in the researchers' study: the teaching metaphors of Alger (2009) are different from the teaching metaphors of the researchers, education system in the Philippines tries to develop and improve the way of teaching just like in other countries and the teaching metaphor scale made by the researchers were reliable.

The six teaching metaphors of Alger (2009) were not the same to the four factor teaching metaphor scale of the researchers. The four new four factors were same with Alger's (2009) teaching metaphors in a way that it has teacher-centered and student-centered items. But the four new factors of teaching metaphor scale do not have high internal consistency due to the small number of items. The first and second pilot testing supported that here in the Philippines the education system is both teacher and student-centered.

Forming a four factor teaching metaphor scale that contains teacher-centered and student-centered items means that the education system here in the Philippines strives to improve the present condition of how students are educated. Now, the teacher does not only focus on how to deliver and provide information to the students and also how the student would be able to develop his/her own learning. The researchers gathered data from schools ranging from public, private, non-sectarian, college, high school, etc., it showed that teachers belonging to these kinds of schools are teacher-centered and student-centered. Also, finding out that teachers here in

the Philippines are both teacher-centered and student-centered, it reflects on how the Philippines deal with providing education. Although there is scarcity of resources for teaching materials in schools that would force the teachers to be more teacher-centered, gradually the teachers try to be student-centered in order for the students to benefit and be trained on how to learn without the help of the teachers. The pursuit to modify traditional teaching in the Philippines is a good indication that the Filipinos are striving to more student-centered. This is due to the results that show little student-centered items in the factor loadings. Although the student-centered metaphors are partial, this still shows that the Philippine educational curriculum is beginning to adjust more on the student's needs.

The four factor teaching metaphor scale by the researchers was reliable and has good fit. This is because of the high internal consistency of the first pilot test, which is 0.78 and the second pilot test, which is 0.67. The Eigenvalues shown in the scree plot show that a four factor model is necessary since the total variance extracted in the next factors are low and almost have the same Eigenvalues. In order to confirm the four factor model, CFA was used and it shows that the four factors in the model have significant relationships. The four factor model also got a GFI of 0.93, which is high and a 0.05 RMSEA that is satisfactory.

References

Alger, C. (2009). Secondary teachers' conceptual metaphors of teaching and learning: Changes over the career span. *Teaching and Teacher Education, 25*, 743-751.

Breault, R. (2006). Finding the blue note: A metaphor for the practice of teaching. *The Journal of Educational Thought, 40*(2), 159-176.

Bullough. R (1992). Beginning teacher curriculum decision making, personal teaching metaphors, and teacher education. *Teaching and Teacher Education, 8*(3), 239-252.

Bullough. R., & Stokes, D. (1994). Analyzing personal teaching metaphors in preservice education as means for encouraging professional development. *American Educational Research Journal, 31*(1), 197-224.

Chapman, O. (2009). Metaphors in the teaching of mathematical problem solving. *Educational Studies in Mathematics, 32*(3), 201-228.

Deikhoff, G. (1992). *Statistics for the social and behavioral science: Univariate, bivariate and mutlivariate*. : Chicago: Wm. C. Brown Publishers.

Grant, G. (1992). The sources of structural metaphors in teacher knowledge: three cases. *Teaching and Teacher Education, 8*(5/6), 433-440.

Greves, S. V. (2005). Butterflies in our classrooms: Using metaphors in teacher education. *The Teacher Educator, 41*(2), 95-109.

Lakoff, G., & Johnson, M. (1980). Metaphors we live by. *Lingua, 56*(2), 185-192.

Leavy, A., McSorley, F., & Bote, L. (2006). An examination of what metaphor construction reveals about the evolution of preservice teachers' beliefs about teaching and learning. *Teaching and Teacher Education, 23*, 1217-1233.

Martinez, M., Narcis, S., & Guenter, L. (2001). Metaphors as teaching blueprints of thinking about teaching and learning. *Teaching and Teacher Education, 17*, 965-977.

Noyes, A. (2006). Using metaphor in mathematics teacher preparation. *Teaching and Teacher Education, 22*, 898-909.

Patton, M. Q. (2002). Teaching and training with metaphors. *American Journal of Evaluation., 23*(1), 93-98.

Saban, A., Kocbeker, B., & Saban, A. (2006). An investigation of the concept of teacher among prospective teachers through metaphor analysis. *Educational Sciences: Theory & Practice, 6*(2), 509-522.

Saban, A., Kocbeker, B., & Saban, A. (2007). Prospective teachers' conceptions of teaching and learning revealed through metaphor analysis. *Learning and Instruction, 17*, 123-139.