
Metaphorical Views of Physics Teachers in Teaching Physics: A Qualitative Phenomenological Study

Mae Anne Regero Migue¹ (corresponding author)

1Department of Teacher Education, College of Teacher Education Arts and Sciences, Visayas State University- Tolosa Campus Tanghas Tolosa Leyte, Philippines; miguemaeanne@gmail.com

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ABSTRACT

Metaphors are words used to describe something or any situation that had happened. It can be used to replace an idea or concept to make a wider view of explaining the other idea and it an avenue for an individual to express what they say indirectly. Physics teachers nowadays faces a lot of struggles throughout their teaching experiences as they practice their profession. That's why this qualitative phenomenological study aimed to understand the views and experiences of science teachers with regards to physics teaching. How do Physics teachers relate, take into account and express their views to physics teaching through the use of metaphors in describing their experiences. Teachers are the one with actual experiences with the students giving them a lot of struggles. Understanding how they feel through their experiences using metaphors could help design and carry out a good teaching and learning environment in Physics subject. This study gathered metaphorical views of Physics teachers about Physics teaching through the process called verbal protocol and was participated by seven Physics teachers who are currently taking up their master's degree in Physics in Philippine Normal University and are also teaching Physics in their respective schools in Luzon. The data gathered were analysed through metaphorical analysis and the results revealed that there are different factors affecting the views of the teachers towards teaching Physics. There are also categories of the metaphors used by the teachers in describing their views towards Physics teaching wherein they considered teaching Physics as a teaching career that let them undergo difficulties and challenges. It is also a teaching that needs passion and goal to let students understand abstract ideas that involves logical mathematical concepts that they considered difficult. Physics teaching also is considered a happy and sad experience for the teacher and it needs labor and patience.

Keywords: metaphorical views; physics teaching; metaphors**INTRODUCTION**

A concrete description gives you a concrete interpretation but a metaphoric description gives you several interpretations. Metaphors are words used to describe something or any situation that had happened. These are words that we can use to replace an idea or concept to make a wider view of explaining the other idea. ⁽¹⁾ Certain experiences could be associated with certain things or phenomenon around us. Using metaphors in describing phenomena is like comparing the experiences to things around us. It gives an avenue for an individual to express what they say indirectly. It could assist and help the receiver, readers and listeners to grasp some thoughts about what the speaker means. Metaphors are simple way of communication, a certain word could mean a lot depending on the experience of the individual. ⁽²⁾

Science is a broad and wide subject matter. It encompasses different fields, the life sciences and physical sciences. Life sciences simply deals with Biology and its branches. On the other hand, physical sciences deals with Astronomy, Chemistry, Physics and their branches. It is also very essential to every country to promote quality science education for the people and also for the economy. As a developing country, science education has been a part of our curriculum for so many years. There are a lot of science teachers in the field who practice their profession through science teaching. But the question is, what are the experiences of these teachers as they teach a certain field in Science?

Physics is one of the field of sciences. It is the study of life phenomena and are expounded by the fundamental laws of nature. ⁽³⁾ Cutnell & Johnson ⁽⁴⁾ said that it was developed out of the efforts of men and women to explain the physical environment. It also a dynamic discipline of science, it always develop abruptly through the years because of new inventions, innovations and space explorations. Its theories, principles and concepts are applied in day to day activities such as in the use of technology-electricity, gadgets and transportation. ⁽⁵⁻⁷⁾ It deals with different concepts on Thermodynamics, Quantum Mechanics, Classical Physics, Electricity and Magnetism, Kinematics, Optics and Modern Physics. ^(3,4,8) Many undergraduate students who are enrolled in education program do not choose Physics as their field of specialization because they find it hard due to low Physics identity which pertains to interest, performance, competence, and recognition. ⁽⁹⁾ And thus, producing few teachers majoring in Physics who currently are teaching in the field. And these Physics teachers do experience a lot of challenges while teaching the subject.

Physics is said to a boring subject among students in secondary schools especially in the rural areas. In the study of Orleans ⁽¹⁰⁾, it is shown that the Philippines lags behind in Physics education than that of other countries.

Teachers have always remarked by their students' performance in Physics achievement due to their negative attitude and lack of interest towards the subject. ⁽¹¹⁾ Physics is hard to understand for the students due to misunderstanding and misconception. ⁽¹²⁾ The fact that physics does not only deal with theories and concepts, the student should also have the skills of analysing word problems, deriving formulas and understanding graphs and figures. These add up to the reason why Physics is considered a cost for other students who lack the skills.

Physics teachers in the field who are teaching the subject always come across the problem towards students' lack of comprehension towards Physics concepts and theories. ⁽¹²⁾ The teacher role here is to make the life of the students easier as much as possible as they deal with the subject. Teachers are said to be the most important instruments in classrooms. ^(1,6) The fact that they make efforts to make an environment fruitful for learning, the challenges that they may have encounter while teaching the subject could have generated sentiments and experiences that are hidden. These views towards Physics teaching could be affected with a lot of factors depending on the experience of an individual teacher.

In the study of Ozturk & Aglarci ⁽¹³⁾, the word metaphor was define as a word that comes from the Greek word "metapherin". "Meta" means to change and "pherein" means to carry. Thus, it is a word use to change a certain word to carry out a different meaning. Metaphors are likely linked to our emotions ⁽¹⁴⁾ and it is simply associated with every bits of experiences we have in different situations. Many studies are already conducted using metaphors in understanding perceptions and views of science teachers, students learning science and even prospective teachers. ^(1,2,6,13,15) Buabeng, et al. ⁽⁸⁾ even pointed out in their study that the physics learning experiences in schools, particularly those provided in the senior secondary school by specialist physics teachers, have been a major concern of many physics education researchers. Thus, teachers who are teaching the subject could be one concern also of the study because they are the prime movers of the curriculum implemented inside the classroom.

According to Guo ⁽¹⁶⁾, metaphor provide a particular perspective in perceiving and underscoring a specific understanding. And thus, using metaphors to identify teacher's perceptions and view could elicit a lot of meaning and different interpretation. The metaphors could be positive and negative but could mean differently depending on how teachers elaborate their experiences and why they choose the specific metaphor to describe their views. It can also resolve uncertain and vague sentiments bringing it into a clearer and understandable idea that is drawn from abstract concepts. ⁽¹⁷⁾

Teachers' perception towards teaching could reflect their practices inside the classroom thus, it is important to know these views and beliefs ⁽¹⁾ in order for us to identify certain problems and be able to find a solution about it. Knowing the implications of the metaphors used by the Physics teachers in stating their views towards Physics teaching could be an avenue to improve and attain quality teaching and learning process in science education. ⁽²⁾ This could also elicit information of what is really happening in the field of teaching and better understanding of the reason why the Philippines' Physics education and literary are way different from other countries. ⁽¹⁰⁾ Metaphors as a methodology of identifying different perception could elicit variety of interpretation. Hence, the metaphors that the teachers will be using describes their experiences; therefore, their attitudes towards Physics teaching could depict their lived experiences as a Physics teacher.

METHODS

In this qualitative study that seeks to understand the views and experiences of science teachers with regards to physics teaching a phenomenological method was used. A phenomenological method is the collecting of data about lived experiences of a certain individual regarding a phenomenon or situation. ⁽¹⁸⁾ This method will allow the researcher to know the different experiences they have with physics teaching by indirectly stating, describing and telling their experiences through the use of metaphors and categorizing these experiences. The study also tries to find out the different factors affecting their experiences in Physics teaching based on the metaphors they've used. This qualitative phenomenological study was participated by seven Physics teachers who are currently taking up their master's degree in Physics in Philippine Normal University and are also teaching Physics in their respective schools in Luzon for academic year 2018-2019 first semester. The sampling technique used was purposive sampling to ensure the quality of the data to be gathered. The participants of this study are solely Physics teachers who took up Physics as their field of specialization and are also teaching the same subject in the field.

For the last 3 years there had been a lot of studies about teacher perceptions using metaphors in various fields of teaching science. ^(1,2,6,13,15) Metaphors are words used to describe something by indirectly stating what the real meaning is. This study gathered metaphorical views of physics teachers about physics teaching through the process called verbal protocol. It is a think aloud method of gathering data wherein the participants, Physics teachers, described and stated their stories and experiences about Physics teaching. They received a piece of paper containing a phrase wherein they are going to supply it with metaphors about their experiences about physics teaching.

"Physics teaching is like..., because..."

Metaphors are likely linked to our emotions ⁽¹⁴⁾ thus, the participants are free to tell everything, positive and negative experiences, and they are free to use any language they want to use for them to be able to convey their thoughts and views. The data was recorded using a voice recorder and transcribed afterwards. After transcribing the data it was presented to the participants for validation of responses and was analysed to form categories and perspectives about Physics teaching based on metaphors and elaboration given by the participants. Their identity was not mentioned in any part of the paper as part of its confidentiality.

The researcher gathered and transcribed all the data it was subject to metaphorical analysis. Metaphor analysis uncovers individuals' perceptions or view towards a certain subject. ⁽¹⁹⁾ At this stage the metaphors that were transcribed was categorized based on their similarities. The data also were analysed using its content to see different factors affecting their views towards physics teaching.

RESULTS

The metaphors used by the teachers in describing their lived experiences while teaching Physics is presented. The researcher gathered different metaphors and subject it to metaphorical analysis where all data gathered were categorized and try to evaluate the factors affecting the metaphors used by the respondents.

Table 1. Metaphors used by the physics teachers to describe their physics teaching experience

Respondents	Metaphor used to describe physics teaching
Teacher 1	Eating a dark chocolate
Teacher 2	Playing baseball game
Teacher 3	Building a table
Teacher 4	Riding in a roller coaster
Teacher 5	Playing a chess
Teacher 6	Climbing a mountain
Teacher 7	Eating an ampalaya dish

Table 1 shows the different metaphors used by the seven respondents that participated in the research. Based on the data gathered the metaphors used to describe Physics teaching are eating dark chocolate, playing baseball game, building a table, riding in a roller coaster, playing a chess, climbing a mountain and eating an ampalaya dish. These metaphors were analysed to see the factors affecting the metaphors used (Table 2) and it was also categorized to see the different lived experiences of the teachers while teaching Physics (Table 3).

Table 2. Factors affecting the choice of metaphor used to describe physics teaching

Respondents	Metaphor used to describe physics teaching	Factors affecting the choice of metaphors used
Teacher 1	Eating a dark chocolate.	<ul style="list-style-type: none"> ▪ Difficulty of the subject. ▪ Students' attitude towards Physics. ▪ The pleasure of knowing students are learning.
Teacher 2	Playing baseball game.	<ul style="list-style-type: none"> ▪ The technicality and accuracy of teaching Physics. ▪ The challenges while teaching the subject. ▪ Skills needed to learn the subject
Teacher 3	Building a table.	<ul style="list-style-type: none"> ▪ The technicality and accuracy of teaching Physics. ▪ The labor and patience. ▪ Application to daily life scenario. ▪ Skills needed to learn the subject.
Teacher 4	Riding in a roller coaster.	<ul style="list-style-type: none"> ▪ The technicality and accuracy of teaching Physics. ▪ The labor and patience. ▪ Difficulty of the subject. ▪ Students' attitude towards Physics.
Teacher 5	Playing a chess.	<ul style="list-style-type: none"> ▪ Difficulty of the subject. ▪ Skills needed to learn the subject. ▪ The pleasure of knowing students are learning.
Teacher 6	Climbing a mountain.	<ul style="list-style-type: none"> ▪ Difficulty of the subject. ▪ Skills needed to learn the subject. ▪ The pleasure of knowing students are learning. ▪ The labor and patience.
Teacher 7	Eating an ampalaya dish.	<ul style="list-style-type: none"> ▪ Difficulty of the subject. ▪ The labor and patience. ▪ Students' attitude towards Physics.

Table 2 shows the different factors that affect the teachers' choice of metaphor to be used in describing their lived experiences while teaching Physics. In the table presented (Table 2) there were seven (7) common factors that was shown in each metaphors used by each respondents:

1. The technicality and accuracy of teaching Physics.

- Teachers need to be accurate with all the information needed to be learned by the students. The different technical terms and symbol must be taught properly which one of the difficulties of the students becomes.
2. The labor and patience.
Teachers put effort on teaching the subject and should have patience of explaining and correcting misconceptions of the students.
 3. Application to daily life scenario.
Teachers want to inculcate the importance of Physics to daily life scenario and that students would be able to appreciate and love Physics.
 4. Skills needed to learn the subject.
Teachers need to let students be familiar with the mathematical formulas and laws for the students to be able to understand fully the concepts, principles and theories of the subject.
 5. Difficulty of the subject.
Teachers need to make the subject easy for the students despite the fact that students think Physics is a difficult subject due to abstract and complex ideas being taught that involves logical mathematical concepts.
 6. Students' attitude towards Physics.
Teachers need to let students love Physics even though most of them don't want the subject. This factor affects the total lived experiences of the teacher while teaching the subject.
 7. The pleasure of knowing students are learning.
Teachers are motivated to teach Physics because of the pleasure it brings to them knowing that their students finally understood and appreciate the lesson that was discussed.

Table 3. Categories of the metaphors used to describe physics teaching experience

Categories	Metaphors	Statement of the teachers
Teaching that undergoes difficulties and challenges	Playing baseball game	Teacher 2 "Okay, as I said a while ago it's like a baseball game. Like for example, the students, when you introduce a concept it is new to them. So, how will you be able to attain your objectives? Usually, we use different strategies and techniques to let the students understand what the concept is. And for me it's the great challenge as a teacher in teaching the subject."
	Building a table	Teacher 3 "In teaching lower years, they have no idea with the mathematical way of dealing with the subject. Here you get to teach the basic in dealing with numbers and entering into the Physics concepts."
	Riding in a roller coaster	Teacher 4 "It's like a roller coaster, sometimes up, sometimes down both for you and the students."
	Playing a chess	Teacher 5 "In Physics teaching, like playing a chess, I am challenged and I am able to express myself."
	Climbing a mountain	Teacher 6 "Physics teaching is like mountain climbing because there are many challenges and difficulties in teaching. As a teacher, I think the subject is very simple but when I teach it to the students they encounter difficulties and it's hard for them to understand."
	Eating an ampalaya dish	Teacher 7 "I love Physics but the students don't like it. It's difficult to let students understand the concepts if they don't have the heart to learn it."
Teaching with passion and goal	Playing baseball game	Teacher 2 "Like playing a baseball game, before you hit the target you should have first the skill, like problem solving, trial error and so on before you hit the goal or understand the lesson."
	Building a table	Teacher 3 "All the variables should be in place, all the needed things must be intact, and there should be a plan to be followed. In teaching Physics it's pertaining to the formulas needed to answer a problem."
	Riding in a roller coaster	Teacher 4 "There are times when you already give too many examples, but the idea is too abstract, and the lesson is too difficult for them to understand and appreciate."
	Playing a chess	Teacher 5 "Physics teaching is like playing a chess. Sometimes you need to depend your lesson. The pones serve as the formulas and explanations to defend your lesson which is your king."
	Climbing a mountain	Teacher 6 "In Physics we all know that it involves mathematics. There are students who find it difficult to understand math, some students find it difficult to understand concepts and some don't understand at all. These serves as the challenges for me on how I will see that beautiful scenario on the top of the mountain after surpassing all these challenges."
Teaching that caters both happy	Eating a dark chocolate	Teacher 1 "My experience in teaching Physics is like a dark chocolate. It's bitter and sweet."
	Riding in a roller coaster	Teacher 4

Categories	Metaphors	Statement of the teachers
and sad experience		“The experience where you are happy because students are getting your lessons. They are comprehending well based on their performance. The downsides are the times when you already give too many examples but the idea is too abstract and the lesson is too difficult for them to understand and appreciate.”
	Climbing a mountain	Teacher 6 “Like climbing a mountain also, when you’re about to start teaching it, for the students it’s quite simple and fun. But, if you’re at the middle and is about to reach the peak, there, the students encounter difficulties and let them think that Physics is hard. They don’t realize how beautiful it is at the top of the mountain.”
	Eating an ampalaya dish	Teacher 7 “I love the ampalaya dish like teaching Physics but though I love it some students may not want to eat it. I just want them to know the good thing about learning Physics. I know the concepts are hard but once they have the full grasp about it they’ll surely love it.”
Teaching that needs labor and patience	Playing baseball game	Teacher 2 “But as a teacher you should be able to inculcate that it is not merely about mathematics. Like playing a baseball game, before you hit the target you should have first the skill, like problem solving, trial error and so on before you hit the goal or understand the lesson.”
	Building a table	Teacher 3 “At first, teaching Physics is hard but as long as you know the process and follow those simple steps you’d be able to build that table of teach Physics but still there are obstacles along the way.”
	Climbing a mountain	Teacher 4 “There are students who find it difficult to understand math, some students find it difficult to understand concepts and some don’t understand at all. But, as teachers we shouldn’t stop teaching them because they should see that beautiful scenario on the top of the mountain after surpassing all these challenges.”

DISCUSSION

Table 3 shows the categories that were formed after the metaphors undergo metaphorical analysis. There were four categories formed during the analysis (1) Teaching that undergoes difficulties and challenges; (2) Teaching with passion and goal; (3) Teaching as both a happy and sad experience; and (4) Teaching that needs labor and patience.

1. Teaching that undergoes difficulties and challenges

Based on the metaphors used by the respondents to describe Physics (Table 2), it is clearly shown that teachers undergo difficulties and challenges as they teach the subject. Most of them mentioned that students have difficulty digesting the concepts because it is taught from the simplest to the most abstract concepts that involved mathematical treatment where some students are not good at.

Teacher 1: “...it’s bitter because we all know that many students don’t like Physics”

Teacher 2: “It’s because in Physics students perceive it as more on computations.”

Teacher 6: “As a teacher, I think the subject is very simple but when I teach it to the students they encounter difficulties and it’s hard for them to understand”

2. Teaching with passion and goal

Teaching Physics most of the time involves logical mathematical concepts and most students don’t possess those skills that’s why they considered the subject difficult and a cost. Thus, as a teacher teaches his/ her students with passion that makes them creative in teaching, not just to understand formulas but to attain the goal of letting students understand the importance of Physics.

Teacher 2: “Like playing a baseball game, before you hit the target you should have first the skill, like problem solving, trial error and so on before you hit the goal or understand the lesson.”

Teacher 3: “All the variables should be in place, all the needed things must be intact, and there should be a plan to be followed. In teaching Physics it’s pertaining to the formulas needed to answer a problem.”

Teacher 6: “In Physics we all know that it involves mathematics. There are students who find it difficult to understand math, some students find it difficult to understand concepts and some don’t understand at all. These serves as the challenges for me on how will I see that beautiful scenario on the top of the mountain after surpassing all these challenges.”

3. Teaching that caters both a happy and sad experience

Teaching Physics is both a happy and a sad experience for Physics teachers. They are happy when the students are learning the subject but they are sad whenever they are doing their best to simplify the concepts and the students still don’t have that enthusiasm to learn the subject. It becomes a burden to them that their students are not learning as well as loving the subject as to how they love Physics.

Teacher 4: “The experience where you are happy because students are getting your lessons. They are comprehending well based on their performance. The downsides are the times when you already give too many examples but the idea is too abstract and the lesson is too difficult for them to understand and appreciate.”

Teacher 6: “Like climbing a mountain also, when you’re about to start teaching it, for the students it’s quite simple and fun. But, if you’re at the middle and is about to reach the peak, there, the students encounter difficulties and let them think that Physics is hard. They don’t realize how beautiful it is at the top of the mountain.”

Teacher 7: “I love the ampalaya dish like teaching Physics but though I love it some students may not want to eat it. I just want them to know the good thing about learning Physics. I know the concepts are hard but once they have the full grasp about it they’ll surely love it.”

4. Teaching that needs labor and patience

Teaching Physics needs labor and patience because the teachers need to put effort on what they are doing just to let students understand complex and abstract concepts. It also needs patience because despite the fact that many students considered Physics as a boring subject (Kizilcik and Yavas, 2016), teachers shouldn’t give up of inculcating to the students the importance of Physics in daily life basis.

Teacher 2: “But as a teacher you should be able to inculcate that it is not merely about mathematics. Like playing a baseball game, before you hit the target you should have first the skill, like problem solving, trial error and so on before you hit the goal or understand the lesson.”

Teacher 3: “At first, teaching Physics is hard but as long as you know the process and follow those simple steps you’d be able to build that table of teach Physics but still there are obstacles along the way.”

Teacher 4: “There are students who find it difficult to understand math, some students find it difficult to understand concepts and some don’t understand at all. But, as teachers we shouldn’t stop teaching them because they should see that beautiful scenario on the top of the mountain after surpassing all these challenges.”

CONCLUSION

Physics teachers’ views towards Physics teaching using a metaphor showed different lived experiences of the teachers. Based on the study conducted, the teachers considered teaching Physics as a teaching career that let them undergo difficulties and challenges. It is also a teaching that needs passion and goal to let students understand abstract ideas that involves logical mathematical concepts that they considered difficult. Physics teaching also is considered a happy and sad experience for the teacher and it needs labour and patience. This views of Physics teachers are affected with the technicality and accuracy of teaching Physics, the labor and patience or the effort of the teacher to create strategies just to make Physics concepts easy to understand, the application of Physics to daily life scenario for the students to appreciate the subject, the skills needed to learn the subject that needs to taught properly by the teacher, difficulty of the subject that involves complex concepts, principles and theories, the students’ attitude towards Physics, and the pleasure that teachers feel seeing their students learning and appreciating the subject.

Recommendation

The study conducted only focuses on the Physics teachers’ metaphorical views about teaching Physics. There were only limited number of participants because the study is only scoped with the teachers taking their Master’s degree in a specified school. Another study may be conducted which is participated with large number of participants and with a wider scope to gather more data to be categorized. This type of study may also be conducted to other groups of teachers teaching Mathematics, Biology, Chemistry and other subjects. This would be able to show different metaphorical views that show their teaching experiences. There, we can make a comparison between the experiences of different groups of teachers teaching different subjects. This type of study also may be conducted to students to find out how they view Physics as a subject. The result may show the problems affecting students’ learning interest towards learning the subject. Many similar studies may be conducted in the future by changing the variables to be studied.

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