# Academic Performance and Learning Styles of Liberal Arts Students in Physical Science

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**Abstract -** *This study aimed to determine the correlation between the academic performance and learning styles of Liberal Arts students in Physical Science of the College of Education, Arts and Sciences in Lyceum of the Philippines University. This study employed the evaluative design using the descriptive method of research. The subjects of this study involved the whole population of the first year AB-Multimedia Arts students who were enrolled during first semester school year 2014-2015. The statistical tools used in this study were frequency distribution, Weighted Mean and Pearson Product Moment Correlation. All data were treated statistically using PASW version 18 at 0.05 alpha level. The findings of the study revealed that students have satisfactory academic performance that they often learned through visual modality and kinesthetic modality but sometimes learned through auditory modality. Furthermore the academic performance of students is correlated to auditory modality. Instructional development activities were proposed which is then recommended to be used by physical chemistry instructors in their instruction.*

**Keywords:** *academic performance, auditory modality, instructional activities, kinesthetic or tactile modality, visual modality.*

## INTRODUCTION

Science education in a global perspective must foster understanding of concepts among students as a result of their intellectual commitments and practices. Such understanding of science concepts is necessary in developing students' skills and abilities in preparation for their exposure to the outside world. Skills like critical thinking, problem solving and information literacy are tools for life-long learners who will contribute to the growth of one's nation [1].

Physical Science is concerned with those areas of science that deals primarily with non-living things such as physics, chemistry, astronomy, geology, oceanography and meteorology. As a subject, it contributed increasingly to the progress of mankind thus, offers greater opportunities for a life of prosperity and fulfilment. As a science, it is an important tool to economic development and socio-cultural changes in developing countries. It is a significant subject in the different programs of study and serves as the foundation of information upon which careers are built.

Furthermore, Physical science as a subject deals with the introduction to a variety of fundamental concepts that enable the student to acquire tools and skills useful at the advanced levels of the study of chemistry and its various sub-disciplines. They have the marvellous opportunity to enjoy teaching and learning scientific phenomena with nature as the teaching aid. Teaching and learning are the central activities of education. They involve the teacher, the learner, the content, the context for instruction and the strategies or different learning styles, learning approach, and intellectual development levels.

Teaching is always a two- way track. The stimulus is teaching and the response is learning. It involves a process intended to bring about a desired result. Palma [2] emphasized that, learning involves a process and brings about an outcome. All learning begins with things around us. They may be objects, persons, or phenomena that we "experience" or that we become aware of through any of our five senses.

According to Acero [3], the Stimulus-Response bond as explained in behavioristic psychology holds that every stimulus elicits an automatic response. Such behavior is not only true of human beings where the animalistic nature is concerned but animals as well, as they operate on the instinctive or sensitive level. However, such reaction may not always be true in situations where human beings behave on a higher or rational-moral level.

Every student follows its own unique way to learn and process information. They learn material in different ways. Some learn by oral repetition, some

may learn by writing it out, while others may learn through practical work. Individuals thus differ in the way they learn. In this paper our focus is on the differences in learning styles.

Learning style includes a set of factors, behaviours and attitudes that enable a student to learn at a particular situation [4]. It pertains to the manner by which learners assimilate information and how they interest and respond to the learning environment. It is characterized by certain indicators such as cognitive, affective, social, and physiological behaviors which can be readily identifies from an individual learner. Teaching-learning process is greatly affected by the learning style of student.

Visual learners readily grasp ideas through the use of charts, graphs, and pictures. Those who preferred to learn through written language, such as reading and writing tasks belong to visual linguistic learners. Jotting down notes, writing down directions and watching lectures make students remember well what is being taught. On the other hand, those who find difficulty with the written languages but prefer use of charts, demonstrations, videos, and other visual materials belong to visual spatial learners. Through their imagination they can readily visualize faces and places [5].

Auditory learners learn by listening to lectures and reading and unusually often talked to themselves. Movement of lips and reading out loud helped a lot for those who have difficulty in reading. Recording their voice, talking to a friend and hearing conversations are some learning practices of this type of learners. They often generalized and summarized what had been discussed in the classroom.

To teach auditory learners is "to tell them what they are going to learn, teach them, and tell them what they have learned". Teachers usually used the Socratic method of lecturing where they extract the ideas of students through questioning and then filling up the gaps with new ideas.

Another type of learners are the kinesthetic learners who assimilate knowledge through doing, touching and moving. They find it hard to concentrate if they will not move or touch anything. They are not contented simply by listening to lectures, they take down notes in order to move their hands. Before reading anything, they prefer to examine first the material and then concentrate in its content after using colored highlighters while reading, drawing pictures and diagrams while taking down notes are some practices done by this type of learners. Zulueta [6] relates physical movement or bodily kinesthetic to the Multiple Intelligence of Gardner where knowledge by body functions can be used to express emotions.

It is important for teachers to consider the learning styles of the students. In so doing, the teacher must plan the lesson in such a way that she would integrate activities that will suit the need of the students .To make the teaching-learning process more meaningful, it is the role of the teacher to help all students of various learning styles to learn.

One factor that affects academic performance is the learning style of students. A teacher must take into account the learning style of students in order to help the learners to improve their academic performance. Based on the Cognitive Field Theories of Learning, learners discover and understand relationships by organizing sensory experiences influenced by the external environment.

Learning styles can be considered also as a good predictor of academic performance and it should be taken into account to improve students' performance specifically in learning physical science. According to Cognitive Field Theories of Learning, learning is a process of discovering and understanding relationships, and of organizing and finding significance in the sensory experiences aroused by the external situation. These theories maintain that the individual exists in an environmental field which is constantly changing. An individual's behavior, therefore, cannot be predicted merely by analyzing his habits and response tendencies. The interest of cognitive-field theorist in developing reflective thinking implies setting up school program that are focused on teaching approaches which are student-centered, as well as problem-centered. This calls for a teacher who understands the nature of the learner and perceives the learner's life space; one who plans, executes and evaluates performance of the students or learning tasks [7].

Some of the benefits of increasing learners' awareness of their own learning styles: "higher interest and motivation in the learning process, increased student responsibility for their own learning, and greater classroom community. These are affective changes, and the changes have resulted in more effective learning" [8]

Kindsvatter, et al. [9] claimed that interest is a factor that should be considered important to learning. Strong interests create a drive that leads to an organization of effects in the pursuit of one's goal. Interests draw the learner's attention, thus bringing


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effective learning. It can be instrumental in motivating learners toward uninteresting work. A learner will involve himself in an uninteresting work activity if it gives him a chance to do something that does interest him. The learners' interest can also be employed to sustain their positive attitude in the subject.

Visual presentation using pictures according to Constantinidou and Baker [10] is best suited for those learners with a strong preference for verbal processing. Visual images can be used for processing information to have a deeper understanding of concept.

Munoz [11] on her study showed that the positive attitude of the students toward adjunct model had a beneficial effect on their general performance in English and Science. The teachers' favorable view of the adjunct model also had a beneficial effect on their teaching competence that also led to students' performance in the subject. The study aimed to find out the effectiveness of adjunct content-based language instruction in developing cognitive academic language proficiency and facilitating academic or cognitive development in science. It also attempted to determine the academic language skills that students need to develop in the content-based language classroom and whether attitude of students and teachers toward content-based language teaching has an effect on second language proficiency and content mastery.

Ricardo [12] described how chemistry is taught in the public secondary schools and determined the factors affecting students' performance in chemistry. She looked into the characteristics of teachers, students, school, and classroom interaction and how each of these factors is related to the performance of students in chemistry. The descriptive correlational designs were used to describe and analyze the factors affecting student achievement, how chemistry is taught, and how each of these factors is related to student achievement in chemistry.

Iran [13] revealed that the teacher factor in General Chemistry instructors among the selected state colleges and universities in Panay was "inadequate" while the school and student factors were "adequate" based on the standards set by the Commission on Higher Education (CHED). Furthermore, the status of General Chemistry instruction in state colleges and universities in Panay was "average".

The mean performance in General Chemistry of male and female students and those from between state colleges and universities did not significantly differ. Students' performance in General Chemistry significantly differed among students taking different courses with those from the Arts and Sciences having the highest performance rating based on their grades.

Magsaysay [14] stated that the quality science education produces students who demonstrate understanding of science concepts, critical and creative thinking skills, and love of appreciation for science. She found out in her study, that the school heads should spearhead the conduct of seminars on content in pure science and on strategies of teaching so that physics teachers could continuously improve their teaching. Curriculum developers were also directed to improve the present curricular offerings in science. Curriculum materials written should conform to the realities of the classroom like the use of improvised materials readily available in the community. Moreover, in-service training programs should be continued to enable the teachers to have a deeper and broader knowledge base on the subject they teach.

Findings of Gonzales [15] study revealed that the personological characteristics which affected the students' performance in Physics were mental ability, aptitude, personality, grades in high school physics, performance in mathematics, parents education, and parents' occupation. Most of the students had average grade in College Physics. Of the mentioned predictors, the aptitude test given and the performance of the students in high school physics were the best determinants of the performance of students in the subject.

Computer Based Instruction (CBI) has great effect on the achievement and problem solving skills of science and technology students [18]. With CBI, teaching is more effective than the traditional instruction because concepts are presented through animation, aside from it will aid the teacher in the testing, evaluation and giving feedback to students. Students are motivated to take an active part in the teaching-learning process so that their creativity, problem solving skills and self-reliance are developed.

Furthermore, Serin [16] stated that interactive lesson in science and technology course can be achieve through the use of videos, slides, CD's, sounds and animations. Interactive learning results to higher achievement among students.

In the light of the foregoing concepts, the researchers who have been in the academe for more than a decade, become interested in finding out the


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academic performance in relation to the learning styles of Liberal Arts students in Physical Science, with the end view of proposing instructional development activities to improve the learning styles of students that will enhance their academic performance.

This study may contribute to Science Education by improving instruction, thus, making the learning and teaching effective.

The students, as the center of the educative process, would benefit most from their realization that their learning styles may have some effect on their academic performance. With this realization, students may develop metacognitive thinking in making decisions related to personal, issues society and environment.

The result of this study may also help teachers to be more aware of their own performances that affect the teaching-learning process. They would be able to give prime consideration in checking the weaknesses and inadequacies of instruction in order to attain quality education. Since teachers provide the proper setting for learning, the results of the study may suggest the kind of instructional materials to be utilized in teaching the subjects.

The administrators, can use the results of this study to serve as basis in planning new curriculum that will help improve students' academic performance in Physical Science.

The study may benefit the Lyceum of the Philippines University as a whole. Teaching-learning with the best instructional activities produces well-learned individuals and well-developed persons, who would contribute to the development of the nation.

Moreover, the findings of this study may serve as reference for future researchers who might wish to conduct more intensive and broader studies. It would be useful if they investigate other learning styles in various areas of science.

## OBJECTIVES OF THE STUDY

The study aimed to determine the correlation betwen the academic performance and learning styles of Liberal Arts students in Physical Science of College of Education, Arts and Sciences of LPU during the first semester of the school year 2014-2015.

Specifically, this study determined the academic performance of students; investigated the learning styles of Liberal Arts students in Physical Science in terms of visual modality, auditory and kinesthetic; determined the correlation between the academic performance and learning styles of Liberal Arts students in Physical Science and proposed instructional development activities to align the learning styles of students for the enhancement of their academic performance.

## MATERIALS AND METHODS

### Research Design

This study employed the evaluative design using the descriptive method of research. A descriptive method of research is one in which information is collected without changing the environment. According to Bickman and Rog [17], correlational research has an end goal of finding the relationship among two or more variables by gathering data from multiple variables and then treating the data with correlational statistical techniques.

### Participants

The subjects of this study involved 20 first year Liberal Arts students of College of Education, Arts and Sciences who were enrolled during the first semester of school year 2014-2015. The whole populations of the AB-Multimedia Arts students were utilized in the study.

### Instrument

The study utilized researcher-made questionnaire to determine the learning styles of students toward Physical Science. The questionnaire on Kolb's Learning Styles developed by two management development specialists, Peter Honey and Allan Mumford [18] were adopted in this study.

The items in the questionnaires were formulated by the researchers based from readings made about learning styles. The construction of the questionnaire was patterned from the instrument developed by Honey and Mumford [18] about Kolb's Learning Styles where they categorize learning styles into visual modality, auditory modality and kinesthetic/tactile modality. The researchers modified the instrument by converting it from the original checklist form into a four-scale Likert instrument where respondents will check the frequency by which they practice the learning style they prefer to use. The instrument was subjected to face validity by consulting experts on learning styles.

### Procedure

Prior to the distribution of the questionnaire, the constructed instrument was subjected to face validity


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by consulting experts about learning styles from the professors of Lyceum of the Philippines University-Batangas. After all their suggestions were incorporated; then the questionnaire was reproduced.

A permit to conduct the study was secured by the researchers from the Dean of the College of Education, Arts and Sciences and from the Research Director of the Lyceum of the Philippine University-Batangas. Upon their permission, the researcher's instrument were distributed and administered to the Liberal Arts Students in Physical Science involved in the study.

After administering and collecting the accomplished questionnaires, the responses were collated, scored and tabulated using statistical measures.

The final grades of students' respondents were obtained from their professor in Physical Science during the first semester of 2014. Pertinent records relevant to the study were carefully examined to get the needed information. Duplicate copies were provided upon request. Cooperation and coordination of student respondents in the conduct of the study were observed to ensure objectivity of the proceedings.

**Data Analysis**

The statistical tools used in this study were Frequency Distribution, Weighted Mean and Pearson Product Moment Correlation. Weighted Mean was used to determine the academic performance of students in Physical Science, while Pearson Product Moment Correlation (r) was used to correlate the academic performance of students in physical science to the learning styles of students. All data were treated statistically using PASW version 18 at 0.05 alpha level.

The given scale was used to analyze the academic performance of students in Physical Science:1.00 = Outstanding (O); 1.25 = Excellent (E); 1.50 = Superior (S); 1.75 = Very Good (VG); 2.00 = Good (G); 2.25 = Satisfactory (S); 2.50 = Fairly Satisfactory (FS); 2.75 = Fair (F); 3.00 = Passing (P). The given scale was used to analyze the result of learning styles of the students: 3.50 – 4.00 = Always (A); 2.50 – 3.49 = Often (O); 1.50 – 2.49 = Sometimes (S); 1.00 – 1.49 = Never (N).

Table 1 presents the academic performance of students' in Physical Science. As indicated in the table, out of 20 respondents, five or 25 percent of them got a grade of 2.0 in Physical Science which is considered to be a good performance.

**RESULTS AND DISCUSSION**

**Table 1. Academic Performance of Students' in Physical Science**

| Performance | F | % |
|---|---|---|
| Very Good | 3 | 15.00 |
| Good | 5 | 25.00 |
| Satisfactory | 2 | 10.00 |
| Fairly Satisfactory | 2 | 10.00 |
| Fair | 5 | 25.00 |
| Passing | 3 | 15.00 |
| **General Average** | **2.37** | |

The same number or percentage of students got a grade of 2.75 which is considered to be of fair performance only. Two students got a grade of 2.25 and another two students or 10 percent of them got a grade of 2.50 which are considered satisfactory and fairly satisfactory performance respectively.

The general average of 2.37 revealed that students have satisfactory academic performance. This is a clear manifestation that the liberal arts students performed satisfactorily in their Physical Science subject because they developed learning styles based on the available instructional facilities and teaching strategies of their teacher.

**Table 2. Learning Styles of Liberal Arts Students' in Physical Science in terms of Visual Modality**

| Indicators | WM | VI | Rank |
|---|---|---|---|
| 1. Jotting down notes makes me remember information better | 3.20 | O | 1.5 |
| 2. I can focus well by looking directly at a person's eye. | 3.20 | O | 1.5 |
| 3. I want to be alone to concentrate with my work. | 3.15 | O | 3 |
| 4. I can recall the page of a book ever when I'm resting. | 2.50 | O | 8 |
| 5. Writing down directions is better than taking them verbally. | 2.60 | O | 6.5 |
| 6. I consider music or background noise as disturbances | 2.60 | O | 6.5 |
| 7. I can't get the idea behind a joke. | 2.35 | S | 9 |
| 8. I prefer to make sketches on my notes. | 2.90 | O | 4.5 |
| 9. I have trouble following lectures. | 2.30 | S | 10 |
| 10. I react very strongly to colours. | 2.90 | O | 4.5 |
| **Composite Mean** | **2.77** | **O** | |

Table 2 presents the learning styles of students in terms of visual modality. As shown in the table,


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students often remember information better if they write it down as revealed by a weighted mean of 3.20 which ranked 1.5th together with the learning style of looking at a person to help keep them focused. On the other hand, students sometimes have trouble in following lectures as indicated by a weighted mean of 2.30 and which ranked 10th among the learning styles.

To sum up, students often learned through visual modality as shown by a composite mean of 2.77. This could be due to the instructional materials used by their teachers in their instruction such a modules, powerpoint presentation and other visual aids necessary in the discussion.

The findings of the study conform with the statement of Constantinidou and Baker [10] claiming that visual presentation through the us e of pictures was advantageous for all adults, irrespective of a high or low learning-style preference for visual images and especially advantageous for those with a strong preference for verbal processing. This findings also affirms Serin's [16] statement that the presentation of topics by means of rich visual materials increases the achievements of the students.

**Table 3. Learning Styles of Liberal Arts Students' in Physical Science in terms of Auditory Modality**

| Indicators | WM | VI | Rank |
|---|---|---|---|
| 1. My papers and notebooks always seem messy. | 2.60 | O | 2 |
| 2. When I read, I need to use my index finger to put my place back on the line. | 2.35 | S | 6.5 |
| 3. I do not follow written directions well. | 2.30 | S | 8.5 |
| 4. If I hear something, I will remember it. | 2.95 | O | 1 |
| 5. Writing has always been difficult for me. | 2.40 | S | 5 |
| 6. I often misread words from the test ( i.e. "them" for 'then'). | 2.30 | S | 8.5 |
| 7. I would rather listen and learn than read and learn. | 2.55 | O | 3 |
| 8. I'm not very good in interpreting individual's body language. | 2.50 | O | 4 |
| 9. Pages with small print or poor are difficult for me to read. | 2.35 | S | 6.5 |
| 10. My eyes tire quickly, eventhough my vision check –up is always fine. | 2.20 | S | 10 |
| **Composite Mean** | **2.45** | **S** | |

The learning styles of students in terms of auditory modality is reflected in Table 3. It can be noted in the table that students often remember something upon hearing it as indicated by a weighted mean of 2.95 and which ranked first among the learning styles. In the contrary, students sometimes experienced that their eyes tire quickly even though their vision check-up is always fine as indicated by a weighted mean of 2.20 and which ranked tenth among the learning styles.

The composite mean of 2.45 shows that students sometimes learned through auditory modality. This is due to the fact that students learn by listening to lectures and reading where teachers ask students to draw as much information before filling in the gaps with the teacher's expertise. This findings conform with Acero's [3] statement that in Stimulus-Response, every stimulus elicits an automatic response. Learning through auditory modality is the result of the teaching style which involved more of Socratic method of lecturing.

Table 4 presents the learning styles of students in terms of kinesthetic or tactile modality. As reflected in the table, students often take study breaks as indicated by a weighted mean of 2.95 and which ranked first among the learning styles. On the other hand, students sometimes start a project before reading the directions as shown by a weighted mean of 2.25 and a rank of ten among the learning styles.

**Table 4. Learning Styles of Liberal Arts Students' in Physical Science in terms of Kinesthetic/Tactile Modality**

| Indicators | WM | VI | Rank |
|---|---|---|---|
| 1. I start a project before reading the directions. | 2.25 | S | 10 |
| 2. I hate to sit at a desk for a long periods of time. | 2.45 | S | 8.5 |
| 3. I prefer first to see something done and then do it myself. | 2.85 | O | 3.5 |
| 4. I use the trial and error approach to problem solving. | 2.85 | O | 3.5 |
| 5. I like to read my textbook while pacing at home. | 2.85 | O | 3.5 |
| 6. I take frequent study breaks. | 2.95 | O | 1 |
| 7. I have a difficult time giving step by- step instructions. | 2.45 | S | 8.5 |
| 8. I enjoy sports and do well at several different typesof sports. | 2.60 | O | 7 |
| 9. I use my hands to describe things. | 2.85 | O | 3.5 |
| 10. I have to write or type my class notes to reinforce the material. | 2.75 | O | 6 |
| **Composite Mean** | **2.69** | **O** | |



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The composite mean of 2.69 is a clear indication that students often learned through kinesthetic or tactile modality. This could be due to the fact that students enjoy hands-on activities where they experience learning through doing. This is similar to how Zulueta et. al. [6] describe kinesthetic learning as the ability to use the body to express emotions, to play a game and to interpret and to invoke effective body language.

**Table 5. Relationship between Academic Performance and Learning Styles of Liberal Arts Students' in Physical Science**

| Learning Styles in terms of: | r-value | p-value | Interpretation |
|---|---|---|---|
| Visual Modality | -0.385 | 0.093 | Not Significant |
| Auditory Modality | -0.644 | 0.002 | Significant |
| Kinaesthetic/Tactile Modality | -0.444 | 0.050 | Not Significant |

*Legend: Significant at p-value < 0.05*

Table 5 presents the relationship between Academic Performance and Learning Styles of Liberal Arts Students' in Physical Science Based from the result, the computed r-values indicate moderate negative correlation, however auditory modality shows correlation since the obtained p-value of 0.002 is less than 0.05 alpha level. This means that the academic performance and auditory modality are correlated.

Thus, as academic performance increases, auditory modality decreases, which means that students who performed well academically are those who do not prefer auditory learning or those who prefer auditory learning only sometimes. This could be due to the students' short span of interest in listening to lectures and reading.

This result is similar to what Kindsvatter, et. al. [10] claimed that interest is a factor that should be considered important to learning. Strong interest create a drive that leads to an organization of effects in the pursuit of one's goal.

**Proposed instructional development**

The proposed instructional development activities aim to align the learning styles of students for the enhancement of their academic performance in Physical Science. Since auditory modality is correlated to academic performance and is preferred sometimes only by students, the proposed activities concentrate more on auditory teaching strategies and auditory learning activities.

## CONCLUSION AND RECOMMENDATION

Liberal Arts students in Physical Science have satisfactory academic performance. Liberal Arts students often learned through visual modality, sometimes learned through auditory modality and often learned through kinesthetic modality. The academic performance of Liberal Arts students in Physical Science is correlated to auditory learning style of students. Instructional development activities for Physical Science are proposed.

The findings of this study may be incorporated in training and seminars of Physical Science faculty. Curriculum planners may include the salient findings of this study as a concrete basis in determining the objectives and methods in the design of Physical Science instruction. Policy makers may utilize the findings of this study as a guideline in considering the educational purposes that science education can best serve. An in-depth study may be conducted in other science subjects that will determine the learning styles of students which will enhance the academic performance of students. The proposed instructional development activities be used by Physical Chemistry professors in designing their instruction to make students learn not only through visual or kinesthetic modality but also through auditory modality.

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