Learning Styles and Factors Affecting the Learning of General Engineering Students

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Abstract
Learning or thinking styles refer to the preferred way an individual processes information and also describe a person's typical mode of thinking, remembering or problem solving. The basic learning styles are visual that uses visual objects such as graphs, charts, pictures, and seeing information; auditory that retains information through hearing and speaking; and kinesthetics that likes to use the hands-on approach to learn new material. Student's difficulty in learning may be due to different factors including the following: intellectual, learning, physical, emotional and social, mental, environmental and teacher's personality. This research aimed to determine General Engineering student's learning styles and identify factors affecting their learning. Forty-five General Engineering 1A and twenty-nine General Engineering 2A were selected as the respondents of this study to evaluate and assess their learning styles and the factors affecting their learning. Based on the data collected, most of the respondents are visual learners and the factors that greatly affect their learning are physical (Health, visual and physical defects, nutrition and physical development) and environmental factors (type and quality of instructional materials and equipment).
Keywords: Learning, Learning Styles, Factors Affecting Learning

Introduction
Learning styles refer to the variations in your ability to accumulate as well as assimilate information. Basically, your learning style is the method that best allows you to gather and use knowledge in a specific manner. Most experts agree that there are three basic learning styles. Each individual may possess a single style or could possess a combination of different learning styles. In most cases, the characteristics of a learning style can even be observed at a relatively young age. Once you have identified your particular learning style you will be able to identify ways in which you can adapt the learning process and your studies to maximize your education (Ldpride.net, 2008). Many educators explore the fact that a number of students have not learned well while in high school and elementary grades. Because of this, students now seem to know less and use despite the availability of the study materials. Likewise, students do not know how to think and study properly and effectively (Laguador, 2013a).

According to Lucas and Corpuz (2007), learning or thinking styles refer to the preferred way of individual processes information and also describe a person's typical mode of thinking, remembering or problem solving. There are several perspectives about learning-thinking styles. Two of which are the sensory preferences and the global analytic continuum. Sensory preferences states that individuals tend to gravitate toward one or two types of sensory input and maintain dominance in one of the following types namely, visual learners, auditory learners and tactile or kinesthetic learners.

Visual learners are those students who jockey for the positions at the front of the class, must have front row theater seats and love to be right up front for sporting events in order to obtain the best view (Ldpride.net, 2008).

Auditory learners are very good listeners. They tend to absorb information in a more efficient manner through sounds, music, discussions, teachings, etc. These individuals will be more likely to record lectures so that they can replay them at a later time for study purposes. Auditory learners appreciate books on tape and may find that reading aloud will help them to retain information. Rather than written reports, auditory learners tend to do better on oral presentations and reports (Ldpride.net).

Kinesthetic learners are tactile learners. This means that they learn best through moving, doing, acting out and touching. Projects that are hands-on in nature are best for kinesthetic learners. Kinesthetic learners tend to become frustrated when they must sit for long periods of time. They enjoy conducting experiments, exploring and performing tasks (Ldpride.net).
    By unlocking your style of learning you can broaden your horizon for new possibilities and help you recognize own strength as well as identify areas for improvement.

Abucay (2009) asserts that the pupil's difficulty in learning may be due to different factors including the following: intellectual factors (special intellectual disabilities), learning factors (lack of mastery of what has been taught, limited background of a certain topic or issue and faulty methods of work and study), physical factors (health, visual and physical defects, nutrition and physical development), emotional and social factors (kind of pupil-teacher relationships in the classroom, the social interaction of relationships among pupils, the relationships among members of the school staff, the physical characteristic of a classroom, social readiness, cooperation versus competition and pupils' attitudes towards teachers), mental factors (attitude), environmental factors (classrooms, textbooks, equipment, school supplied and other instructional materials) and teacher's personality (the vital tasks of the teacher should have the power to lead and to inspire pupils through the influence of his personality and example).

Objectives of the Study
This research is focused on 1st and 2nd year General Engineering Student's Learning Styles and Factors Affecting their Learning. It is also intended to determine the rate which the different factors affects the learning of the respondents in terms of physical and environmental; personal (intellectual, mental, emotional and social), and teachers and learning as well as to propose a plan of action to enhance the learning of respondents based on the findings of the study.

Review of Literature

Students must realize the importance and objectives of having knowledge, skills and attitude which are significant in their future employment (Laguador, 2013b). In learning the alphabet, you made some mistakes along the way, but at some point you learned all your letters. You changed from someone who did not know the alphabet to someone who did. Learning anything new involves change. But it is also a relatively permanent influence on behavior. Once you learned the alphabet, it did not leave you. Once you learn how to drive a car, you do not have to go through the process again at a later time. You learned the alphabet through experience with the letters—you may have learned it by watching *Sesame Street.* Through experience, you may have also learned that you have to study to do well on a test, that there usually is an act at a rock concert, and that field goal in American football adds 3 points to the score. Putting these pieces together, we arrive at a definition of learning: a relatively permanent change in behavior that occurs through experience (Santrock, 2005).

Learning is the process of gaining understanding that leads to the modification of attitudes and behaviours through acquisition of knowledge, skills and values, through study and experience. Learning causes a change of behavior that is persistent, measurable, and specified or allows an individual to formulate new mental construct or revise a prior construct (conceptual knowledge such as attitudes or values). It is a process that depends on experience and leads to long-term changes in behavior potential. Behavior potential describes the possible behavior of an individual (not an actual behavior) in a given situation in order to achieve a goal. But potential is not enough, if individual learning is not periodically reinforced, it becomes shallower, and eventually, will be lost in that individual (Ornos, et al., 2011)

Gagne defined earning as cumulative; a mechanism by which an individual becomes a competently functioning member of society; and it results in different kinds of human behaviors like different human capabilities, which are required both from the stimulation from the environment and the cognitive processing undertaken by the learners (Aquino, 2009).

It is an integrated, on-going process, occurring within individual, enabling him to meet specific aims, fulfill and interests and cope with the living process. Conceptually, the process of learning involves five distinct phases: unfreezing, problem diagnosis, goal setting, new behavior, and refreezing (Ornos, et al., 2011).

Learning styles refer to the variations in your ability to accumulate as well as assimilate information. Basically, your learning style is the method that best allows you to gather and use knowledge in a specific manner. Most experts agree that there are three basic learning styles. Each individual may possess a single style or could possess a combination of different learning styles. In most cases, the characteristics of a learning style can even be observed at a relatively young age. Once you have identified your particular learning style you will be able to identify ways in which you can adapt the learning process and your studies to maximize your education (Ldpride.net, 2008).

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preferences states that individuals tend to gravitate toward one or two types of sensory input and maintain dominance in one of the following types namely, visual learners, auditory learners and tactile or kinesthetic learners.

Many students discover that they are visual learners. It is estimated that approximately 65% of the population are visual learners. These students commonly use visual aids, such as graphs and diagrams, to assist them in putting material into perspective. Such visual aids can make it much easier to remember content later than if they had just heard the information. Visual learners need to see material in order to understand it. Preferred test styles for visual learners are essays, maps, and diagramming while the worst test types for them are listen and respond style (Ldpride.net, 2008).

RiCharde further breaks down visual learners into: Visual-iconic. Those who refer this form of input are more interested in visual imagery such as film, graphic displays, or pictures in order to solidify learning. Hey usually have good picture memory, a.k.a. iconic imagery and attend to pictorial detail. They would like to read a map better than to read a book; Visual-symbolic. Those who prefer this form of input feel comfortable with abstract symbolism such as mathematical formulae or the written word. They would prefer to read a book than a map and would like to read about things than to hear them. They tend to be good abstract thinkers who do not require practical means for learning (Lucas, & Corpuz, 2007).

On the other hand, auditory learners are very good listeners. They tend to absorb information in a more efficient manner through sounds, music, discussions, teachings, etc. These individuals will be more likely to record lectures so that they can replay them at a later time for study purposes. Auditory learners appreciate books on tape and may find that reading aloud will help them to retain information. Rather than written reports, auditory learners tend to do better on oral presentations and reports (Ldpride.net, 2008).

Another form of learning style is kinesthetic learning. Kinesthetic Learners learn best through moving, doing, acting out and touching. Projects that are hands-on in nature are best for them. Learners of this style tend to become frustrated when they must sit for long periods of time. Conducting experiments, exploring and performing tasks are activities that they enjoy doing (Ldpride.net, 2008).
It is estimated that about 5% of the population are kinesthetic or tactile learners. The kinesthetic learning style refers to the ability to absorb information best by experiencing, touching, doing, moving and being active in some manner. Persons who fall into this category prefer situations which are hands-on and which provide them with the opportunity to assemble parts and take part in a physical activity (Ldpride.net, 2008).

Kinesthetic learners tend to be touchers or feelers. Best test types for kinesthetic learners are fill in the blank and multiple choice while the worst test type for them is long essay tests (Ldpride.net, 2008).

A good match between students' learning preferences and instructor's teaching style has been demonstrated to have positive effect on student's performance (Harb & El-Shaarawi, 2006). According to Reid (1995), learning preference refers to a person's "natural, habitual and preferred way" of assimilating new information. This implies that individuals differ in

regard to what mode of instruction or study is most effective for them. Scholars, who promote the learning preferences approach to learning, agree that effective instruction can only be undertaken if the learner's learning preferences are diagnosed and the instruction is tailored accordingly (Pashler, McDaniel, Rohrer, & Bjork, 2008). I hear and I forget. I see and I remember. I do and I understand." (Confucius 551-479 BC) – a quote that provides evidence that, even in early times, there was a recognition of the existence of different learning preferences among people. Indeed, Omrod (2008) reports that some students seem to learn better when information is presented through words (verbal learners), whereas others seem to learn better when it is presented in the form of pictures (visual learners). Clearly in a class where only one instructional method is employed, there is a strong possibility that a number of students will find the learning environment less optimal and this could affect their academic performance (Mlambo, 2011).

According to Abucay (2009), pupil's difficulty in learning may be due to these factors: Intellectual factor which refers to remarkable praises in school is generally closely related to the intellectual level of a pupil; l*earning factors which is l*ack of mastery of what has been taught, limited background of a certain topic or issue and faulty methods of work and study are related factors that affect learning; p*hysical factors which is h*ealth, visual and physical defects, nutrition and physical development affect the learning process; e*motional and social factors* which recognizes that various responses of the individual to various kinds of stimuli are determined by a wide variety of tendencies; m*ental factors which* attitude plays a large role in the mental organization and general behavior of the individual; environmental factors which is the type and quality of instructional materials and equipment play an important role in the efficiency of the school's instruction; and t*eacher's personality* wherein the teacher is an important element in the learning environment or in the failures and success of the learner. The vital tasks of the teacher should have the power to lead and to inspire pupils through the influence of his personality and example.

Materials and Method
The descriptive method was utilized in this study since it involved collecting and interpreting data in order to gather information needed to serve its purpose. Quantitative research focuses on numbers or quantities. Quantitative studies have results that are based on numeric analysis and statistics. Often, these studies have many participants. It is not unusual for there to be over a thousand people in a quantitative research study. It is ideal to have a large number of participants because this gives analysis more statistical power (Henninger, 2009).

The total respondent population came from forty-five (45) General Engineering first year. They consisted of thirty-four (34) male students (75.56%) and eleven (11) female students (24.44%) both have a mean age of sixteen (16). The total respondent population from the second year General Engineering is twenty-nine (29), with a computed mean age of seventeen (17). They consisted of twenty (20) male students (68.97%) and nine (9) female students (31.03%).

The researchers of this study utilized a questionnaire as a primary data gathering instrument. The researchers used two different questionnaires. The first questionnaire identifies the learning style of the General Engineering students. The questionnaire is composed of

fourteen (14) questions provided with three choices namely A, B, and C which corresponds to visual, auditory and kinesthetic, respectively. A student is required to choose only one from the given choices. The numbers of A, B and C that are chosen are tallied. The choice with the highest tallied total number will correspond to the learning style of that student. In case of a tie between the total number of the choices, it will only mean that the student practices a mixed learning style that encompasses two or three of the basic learning styles.

The second part determines how different factors affect General Engineering student's learning such as physical, environmental, personal (intellectual, mental, emotional and social), and teacher and learning. The questionnaire is composed of fifteen (15) views about learning factors. Five (5) views for each categorized factor are presented. The provided rating for each view is as follows: 4 (Strongly Agree), 3 (Slightly Agree), 2 (Slightly Disagree) and 1 (Strongly Disagree). The rating average for each categorized factor is computed. The categorized factor with the highest rating average is the factor that greatly affects the learning of the student.

The researchers gathered information through the use of textbooks, internet, and other articles. The researchers conducted surveys through two questionnaires with the first and second year General Engineering students as respondents. Forty-five (45) General Engineering 1A and twenty-nine (29) General Engineering 2A were chosen through random sampling. They participated in groups and were asked to read the given directions for the questionnaires carefully with full understanding. While the participants are answering the questionnaires, the surveyor/researcher should be present to entertain any questions and see to it that the data needed are filled up.

The questionnaires were personally administered by the researchers. The respondents were informed regarding the data and information provided will be treated with strict confidentiality and will solely be used for the purpose of the study.

The number of responses for each letter/choice is added. The area with the highest total number of response is the primary mode of learning of the respondent. The average score of each choice namely, A, B and C is computed by adding their respective total individual response divided by the total number of respondents. The area that accumulates highest score will be the primary mode of learning of the respondents. The composite mean of each question under the categorized factors is computed by adding all their individual rating divided by the total number of respondents. The categorized factor with the highest computed composite mean is the one that greatly affects the learning of the respondents. Percentage and weighted mean were the statistical tools used in the study

Results and Discussion

Table 1
Learning Style of Respondents

Learning Styles	Percentage (%)	
	General Engineering 1A (n=45)	**General Engineering 2A** (n=29)
Male		
Visual Only	55.88	80.00
Auditory Only	20.59	10.00
Kinesthetic Only	8.82	-----
Visual & Auditory Learners	8.82	5.00
Visual & Kinesthetic Learners	2.94	5.00
Auditory & Kinesthetic Learners	2.94	-----
Female		
Visual Only	90.91	88.89
Auditory Only	9.09	-----
Kinesthetic Only	-----	11.11
Visual & Auditory Learners	-----	-----
Visual & Kinesthetic Learners	-----	-----
Auditory & Kinesthetic Learners	-----	-----
Overall		
Visual Only	64.44	82.76
Auditory Only	17.78	6.90
Kinesthetic Only	6.67	3.45
Visual & Auditory Learners	6.67	3.45
Visual & Kinesthetic Learners	2.22	3.45
Auditory & Kinesthetic Learners	2.22	-----

Male General Engineering first year is mostly composed of visual learners (55.88%) but the least of visual & kinesthetic learners (2.94%) and auditory & kinesthetic learners (2.94%). Female General Engineering 1A is mostly composed of visual learners (90.91%) but the least of auditory learners (9.09%). Overall, General Engineering 1A is mostly composed of visual learners (64.44%) but the least of visual &kinesthetic learners (2.22%) and auditory & kinesthetic learners (2.22%).

Male General Engineering second year is mostly composed of visual learners (80%) but the least of visual & auditory learners (5%) and visual & kinesthetic learners (5%). Female General Engineering 2A is mostly composed of visual learners (88.89%) but the least of kinesthetic learners (11.11%). Overall, General Engineering 2A is mostly composed of visual learners (82.76%) but the least of kinesthetic learners (3.45%), visual & auditory learners (3.45%), and visual & kinesthetic learners (3.45%).

Male General Engineering students have a more diverse learning style compared to Female General Engineering students. Most of the respondents learn best when they watch someone show them how, if they have to learn how to do something. They often find that they visualize what they are reading in their mind's eye. In giving directions, they see the actual places in their mind as they say them or prefer them. If they are unsure how to spell a word, they write it in order to determine if it looks right. In writing, they are concerned how neat and well-spaced their letters and words appear. If they had to remember a list of items, they would remember it best if they wrote them down. They prefer teachers who use the board or overhead projector while they lecture. When trying to concentrate, they have a difficult time when there is a lot of clutter or movement in the room. When solving a problem, they write or draw diagrams to see it. When given written instructions on how to build something, they read them slightly and try to visualize how the parts will fit together. To keep occupied while waiting, they look around, stare, or read. If they had to verbally describe something to another person, they would be brief because they do not like to talk at length. If someone were verbally describing something to them, they would try to visualize what he/she was saying. When trying to recall names, they remember faces but forget names.

Factors Affecting Learning
Table 2
Factors Affecting Learning

Factors	General Engineering 1A (n=45)		General Engineering 2A (n=29)	
	$\bar{x}$	Verbal interpretation	$\bar{x}$	Verbal interpretation
Physical and Environmental	3.29	Slightly Agree	3.37	Slightly Agree
Physical	3.13	Slightly Agree	3.31	Slightly Agree
I cannot concentrate on lessons, when I am hungry.	3.18	Slightly Agree	3.48	Slightly Agree
I make sure that I exercise at least once a week.	3.07	Slightly Agree	3.14	Slightly Agree
Environmental	3.41	Slightly Agree	3.41	Slightly Agree
The institution provides facilities conducive for learning.	3.40	Slightly Agree	3.55	Strongly Agree
Various books and references available in the library provide me significant information.	3.38	Slightly Agree	3.31	Slightly Agree
The department provides us with proper equipment that we can use.	3.44	Slightly Agree	3.38	Slightly Agree
Personal (Intellectual, Mental, Emotional and Social)	2.95	Slightly Agree	2.99	Slightly Agree
I don't experience bullying in school.	3.18	Slightly Agree	3.34	Slightly Agree

I don't get scolded for having failing grades in my subjects.	2.80	Slightly Agree	2.83	Slightly Agree
I have a high self-esteem.	2.93	Slightly Agree	3.10	Slightly Agree
I don't have any family problems and issues.	2.62	Slightly Agree	2.48	Slightly Disagree
I am patient when it comes to understanding my lessons.	3.24	Slightly Agree	3.21	Slightly Agree
Teacher and Learning	3.25	Slightly Agree	3.16	Slightly Agree
My teacher's method of teaching fits my way of learning.	3.16	Slightly Agree	3.14	Slightly Agree
My teacher inspires me by means of different motivations for a better academic performance.	3.47	Slightly Agree	3.31	Slightly Agree
My teacher is sympathetic, loving, enthusiastic and cheerful.	3.31	Slightly Agree	3.17	Slightly Agree
I have a vast background about my subjects.	3.04	Slightly Agree	3.1	Slightly Agree
I practice effective study habits.	3.27	Slightly Agree	3.1	Slightly Agree

Legend: 1.00-1.49 (Strongly Disagree), 1.50-2.49 (Slightly Disagree), 2.50-3.49 (Slightly Agree), 3.50-4.00 (Strongly Agree)

Physical and environmental factors greatly affect the learning of both General Engineering 1A (3.29-slightly agree) and General Engineering 2A (3.37-slightly agree). Thus, environmental factors affect the learning of the respondents more than the physical factors. Personal (intellectual, mental, emotional and social) factors least affect the learning of both General Engineering 1A (2.95-slightly agree) and General Engineering 2A (2.99-slightly agree)

All of the factors are verbally interpreted as slightly agree for that reason all of this factors affects the learning of the respondents in different ways. Among all factors, physical and environmental factors greatly affect the learning of the respondents. Environmental factors have a greater impact when it comes to the respondent's learning compared to physical factors, based on their respective composite mean.

Most of the respondents cannot concentrate on lessons, when they are hungry. They also make sure that they exercise at least once a week. The respondents slightly agree that the institution provides facilities conducive for learning; various books and references available in the library provide them significant information; and the department provides them with proper equipment that they can use.

Physical factors including health, nutrition and physical development affect the learning process. Malnutrition interfere the whole aspects of personality of a child. This will affect the visual, auditory as well as the physical health of a child that will alter his ability to learn and concentrate. Environmental factors including the type and quality of instructional materials

and equipment play an important role in the efficiency of the school's instruction (Abucay, 2009).

Due to rise of poverty levels, too many children are turning up at school hungry, poorly dressed and unfit to study. They aren't able to concentrate properly because they haven't eaten, sometimes for days, and are tired and stressed (Harris, 2011).

The lack of interest among school children indicates a weakness on the part of the school system to make education interesting for the students. This may be due to poor teaching quality, inadequate facilities and supplies and poor infrastructure (Sisante, 2008).

Table 3
Proposed Plan of Activities

Objectives	Activities	Authorized	Time Bound	Expected Outcome
• To promote fitness and healthy lifestyle	• Conduct a seminar that tackles about fitness and healthy lifestyle	• Department and Counseling and Testing Center	• July	• Students will be aware of the importance and benefits of fitness and healthy lifestyle
• To make the learning environment of students, more conducive	• Implement strict prohibition of any unnecessary noises that may interrupt ongoing classes/activities and may disturb students that are studying.	• Department and Library Staff	• June – August	• The students will find learning in school more conducive
• To provide students with complete and functional equipments to use	• Complete all necessary equipments that the students need	• Department	• February - June	• This will satisfy the needs of the students when it comes to different

				lab activities
• To provide students with new instructional materials that they need	• Provide students new instructional materials that lacked in the library	• Faculty Members and Library Staff	• January-February	• New instructional materials will be provided in the library that will surely be helpful for the students
• To know the emotional and social status of the students and somehow put a remedy/solution to most of their issues	• Conduct counseling for each students	• Counseling and Testing Center	• July - August • November-December	• The students will be relieved of some of their burdens and will be able to concentrate more on their studies
• To build and boost student-teacher relationship	• Implement social activities that will build up student-teacher relationship	• Department and Faculty Members	• December	• The students will feel comfortable in having conversations with their professors regarding subject matters.
• To instill the importance of the awareness of the learning style of a class	• Seminar/talk (the professors as participants) regarding the importance of the awareness	• School Authorities, Human Resource Department and Counseling and	• June - July	• The professors would be aware of the importance in knowing the learning

	of the learning style of a class	Testing Center		style of a class
• To know the learning style of each student and section	• Assessment of each student's learning style	• Counseling and Testing Center	• June – July	• The professors would review their teaching strategies to the learning style of their students.

Conclusion and Recommendation

General Engineering students' primary mode of learning is visual learning. The factors that greatly affect the learning of General Engineering students are physical and environmental factors, thus environmental factors has a greater impact to their learning compared to physical factors.

The school authorities in partnership with the human resource department and the counseling and testing center may provide a seminar/talk (the professors as participants) regarding the importance of the awareness of the learning style of a class. During the first few weeks of the semester, each section must be administered with a learning style questionnaire. The results of the said examination must be disseminated to their respective professors for them to be aware and review their teaching strategies to the learning style of their students. The institution must look into the development of their facilities (library and classrooms) for a more conducive learning environment. Since the institution is currently establishing outcomes based education, the students needs to be more productive and produce outcomes that will at least satisfy or exceed the standard which can be made possible by studying not only classroom textbooks but also different instructional materials that will supplement their course of study and increase their acquired learning.

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