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LEARNING STYLES, STUDY HABITS, AND ACADEMIC PERFORMANCE OF COLLEGE STUDENTS AT KALINGA-APAYAO STATE COLLEGE, PHILIPPINES

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Abstract: *Defined learning style and established study period are two things that help direct learners to improve their capabilities in learning Mathematics. This study focused on the description and evaluation of the perceptional learning style, study habits and its significance to the students' academic performance , particularly in College Algebra. Three sets of questionnaires were used to gather the numerical data: the Learning Style Inventory guide, the study habit assessment form, and the teacher-made test.*

This includes one hundred (100) students who were enrolled in College Algebra during the second semester of 2013 at Kalinga-Apayao State College. The study showed that 46% percent of the students are have desirable learning through visual style of the learning, thirty-six(36%) percent prefer auditory learning and only 18% of them prefer tactile style of learning. On the hand, it is observed that the students had an average study habit .Among the indicators; the students got a highest mean of 2.05 in the number of hours in studying their lessons. On the students' performance, it was noted that the students in College Algebra had an" average performance" as evidenced by the computed mean of 2.15. Specifically, there are 50 % of them fall under average performance, 35% of them are within" low performance." While only 15% of them have "high performance."

In the assessment of whether there is a significant difference of the study habits and the performance of the students, the null hypothesis is rejected. This implies that the study habits of the students in College Algebra have great impact to their performance in the said subject. The students described themselves as visual style in learning and auditory rather than being tactile. When asked if what areas do they students need remediation in learning College Algebra, they reflected that: 35% of the students need remediation on the following areas: synthetic division and quadratic equations, and systems of equations with problem solving. There are 30 0r 30 % of the students need remediation on the areas like: Rational expressions and equations. Polynomials and Algebraic expressions also are areas where students need remediation.

Keywords: *College Algebra, Academic Performance, Learning Style, Study Habits, Learning Capabilities*

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INTRODUCTION

Education as the key to development is mandated to upgrade teaching effectiveness among educators as well as learning efficiency among learners .Many efforts by school administrators have been done to improve the retention of college students. Academic advising, orientations, facility improvements, mentoring, and continuous modifications to curriculum and pedagogy are being made continuously to ensure that the controllable variables are explored without reducing then self determination of the students. Most of these student support services have proven to be insufficient in improving student retention among large populations of students.

Students learn in a variety of ways, and their ability to attain this information also varies. A student's capacity to learn is impacted by the teacher's style of conveying information. Unfortunately, little attention has been given to how children think (Markova, 1992). Often, it is assumed that students' minds operate in the same way as the teacher's does. So much of student failure in school comes directly out of the larger failure to stimulate all those areas in the children's brains, stimulation which could open up their minds in so many ways (Markova, 1992).

The distinction of the individuality of students can be illustrated by the diversity of their test scores. When most students begin school, their test scores are comparable but their experiences are varied (Popham, 1998). As their formal education continues, most students in a specific classroom are taught in the same style – the style most compatible to that teacher. Just as each student possesses different types of knowledge from his/her experience, so does each student process information differently to complete the learning cycle. As a result of the students' hereditary factors, their particular life experiences and the demands of their environment, students develop learning styles that emphasize certain learning abilities over others (Guild and Garger, 1985).

Mathematics Learning is regarded as complex and technical that most students are afraid of. To minimize such negative reactions of students towards the subject, the educators continuously keeps on finding solutions to this by considering the learning styles and study habits of the learners. Since learning can take place in three ways such as learning styles, study habits, experiences and formal trainings.

Presently, teachers commonly observed that students' level of achievements are getting deteriorated especially in Mathematics, Science and English and in other fields of studies. It was actually observed that in a class of 50 students, only twenty-five percent of them have very satisfactory achievement and thirty percent are only satisfactory. This observation was based on the actual performance of secondary students who came from remote schools between the years 2004 to present.

The Kalinga –Apayao State College institution , whose clients (students) are coming from far flung areas of Kalinga and the neighboring provinces, is charged to provide quality and quantity knowledge and skills to its clients. Today, more challenges and responsibilities are approaching for its care. It's time to care and mind the needy students. That is, educators must care to know the hidden factors that hinder mental, social, and spiritual development of their learners especially that it has been observed that most of the students do not have the full background of mathematics education before entering in higher level of education. To resolve such gap in mathematics teaching and learning, research in students' individuality in learning has to be done.

The aforementioned observations motivated this study to trace the roots of such weaknesses of students in the fields of Mathematics, Science and Language. However, the focused is on Mathematics – Algebra through evaluation of students' learning style and study habits as well as the academic performance .

RATIONALE

The purpose of this study is to determine whether a student's knowledge of his/her learning style influences her /his performance in learning College Algebra and use it to improve the result of exit exam in math during the semester. Students must also be oriented on what do they belong in the different learning styles so that they will benefit from it and knows how to counter act their weaknesses. It is also bent to look into the weaknesses and needs of the students in learning College Algebra.

Measuring the achievements of students should not be enough as bases in evaluating how students got there course. Their learning style relationship with their achievement or their study habits are great factors to look at by Mathematics educators. These are two things (learning style and study habits) are usually the reasons that made the achievements low or high when these are not discovered and used to strengthen the learners level of learning.

The study, then, described the learning styles, study habits of students in Algebra and show how these two things are related it to their performance. Hoping that the findings will be a great source of information to enrich the level of knowledge and abilities of students in Algebra.

CONCEPTUAL FRAMEWORK

Learning style is defined as “a person’s preferred mode of learning (Smith (1982)." James and Blank explain that a learning style is the “complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store and recall what they are attempting to learn”24(James & Blank, 1993, p.48). Swanson quotes Reichmann's reference to learning style as "a particular set of behaviors and attitudes related to the learning context" and also presents Keefe's definition of learning style as "the cognitive, affective, and physiological factors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (Swanson, 1995, p. 2)

The study of learning styles has brought great attention the importance of modifying curriculum and unification of the perceptual differences of students. According to Barbe (1981) and Dunn (1988), research has developed more complex and comprehensive models that considers the effect to other elements of a person’s unique learning style. For example, Keefe (1987) described three dimensions of personal preferences or styles in learning, as was stated in the dissertation by E. Paul (2001):

- *Cognitive styles* – information processing to include the way one encodes, Processes, stores, retrieve, and decode information;
- *Affective styles* – personality dimensions to include attention span, motivation, Interests, and emotions; and
- *Physiological styles* – to include gender behavior, health-related behavior, and physical environmental conditions

Dunn (1989) states that identifying one’s learning style is much easier than explaining its existence. Students are affected by their own emotionality, sociological,

Environmental and physical preferences. According to Dunn, Dunn and Price (1979) each individual learns through complex set of reactions to varied stimuli, feelings and previously established thought patterns that tend to be present when an individual learns. The learning

process is conceived as environmental, emotional, sociological and physiological. The major premise of how individuals learn, not the skills used in learning, is the foundation for the Learning Style Inventory.

Learning styles research is used in human resource management, sales, team development, counseling, academic applications, and many other fields (Kevin, 2010). Within the Academic applications of learning styles research, there are two general applications of learning styles information that affect classroom instruction and student learning. These two applications (often referred to as "using learning styles" in the classroom) are: 1. the use of learning styles information, surveys, and prescriptions by students to increase self awareness and study skills. 2. The use of learning styles information, resources, facilities, and surveys by teachers and administration to customize pedagogy and the learning environment.

There was a considerable research that examined the relationship between students' learning styles and their academic performance (Witkin, 1973; Gregorc, 1979; Claxton and Murrell, 1987; Brunner and Majewski, 1990; Schroeder, 1993; Klavas, 1993). These studies have consistently found that when learning styles were considered in the teaching process, academic performance increased. Schroeder states that accommodating the variations in learning styles could improve curricula and the teaching process (1993).

This research will concentrate solely on the first application which places the responsibility on the student. Ideally, the student is expected to become more self aware

And apply the new information obtained from the *BE Learning Style Profile* in the Improvement of their study habits and classroom achievements.

FRAME WORK

This study adopted the framework illustrated below:

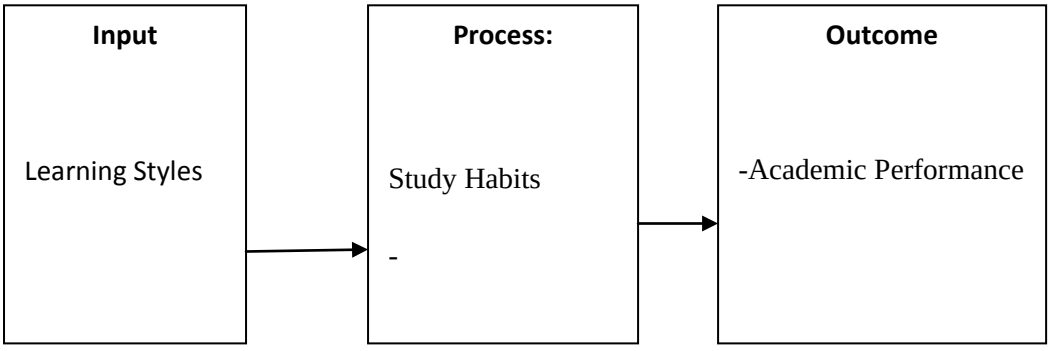

Figure 1

Introductory Algebra is the entry level course for many community college students. By assessing, identifying and explaining students' learning styles, it is hypothesized that there will be a significant increase in achievement for students who customize their study habits to suit their individual learning styles. Students' understanding of their unique learning styles has been repeatedly shown in recent research to have positive effects on student success in entry level courses. This effect is especially true in math courses (Garcia-Otero & Teddlie, 1992; Mangino & Griggs, 2003; Nelson, Dunn, Griggs, et al., 1993; Rochford, 2004; Rochford & Mangino, 2006). If the knowledge and the use of learning styles information are proven in this research to have a significant effect on achievement, then the assessment of students' learning styles will become a more accepted retention tool that could be used in the first few weeks of college preparatory classes.

STATEMENT OF THE PROBLEM

This study sought to assess the learning styles, Study Habits, and academic performance of the students in College Algebra. Specifically, the research sought to answer the following questions:

1. What are the learning styles displayed by the students in learning Mathematical concepts in College Algebra?

   What are the study habits of the students in terms of the following:

   a. Hours spent in studying daily lessons in Mathematics?
   b. Supplemental and Advance Reading based on syllabus

2. What is the significant difference the study habits of the students when they are classified as to gender?

   2.1 Is there a significant difference of the study habits of the students when they classified as to gender?

   2.2 There is no significant difference of the study habits of the students when they classified as to gender.

3. What is the academic achievement level of the students in College Algebra?
4. What is the relationship of the students' study habits to their academic performance level in College Algebra?

   4.1 Is there a significant relationship of the study habits and the academic performance of the f Students in College Algebra?

4.2 Hypothesis: There is no significant relationship of the study habits and the academic performance of the Students in College Algebra?

5. In what areas do they students felt need for remedial classes in learning Algebra?

METHODOLOGY

The study made of use descriptive survey using the learning style inventory questionnaire, study habits assessment, and the achievement test questionnaire in Algebra. This was conducted to the 100 students who composed two sections of Algebra scheduled at 7:30 – 9 am and 2:30 – 4 pm during the second semester of 2012 at Kalinga- Apayao State College. The study considered two sections that were uncontrolled group of respondents.

DATA GATHERING, ADMINISTRATION, AND INSTRUMENTATION

There are three instrument used in this study, the Learning Style Inventory questionnaire and the Study Habit assessment form , and the teacher -made comprehensive tests . The teacher-made test was considered valid since it was pre-tested and post-tested and was statistically treated with the use of the Pearson correlation. While questionnaire on learning styles, the Learning Style inventory by Dun and Dun was adopted in this study. On the other hand, the questionnaire on study habit was patterned in the study of Dr. Ranjana Choudhury.

The study conducted first the survey on learning style and study habits. In the process, the students were asked to accomplish the Learning Style Inventory questionnaire and the Study Habit assessment form at the beginning of the term. After which they were given the teacher –made comprehensive tests during the term from which the results were recorded as their performance basis.

STATISTICAL TREATMENT

To present and analyze the data, the data were first presented into tables using the frequency counts and percentage distribution. The raw data on learning styles were categorized as visual, auditory and tactile with use frequency counts. While the data on study habits were classified as “high”, average, and low if three , two and one hour are spent by the students in studying Mathematics lessons, reading supplemental materials and doing homework or assignment respectively. Further, the mean, chi-square test and t-test were used to see the differences and relationships between and among the variables. Descriptions and discussion of the results were done after each table presentation.

RESULTS AND DISCUSSION

Table 1 Learning Style of the students' respondents of the two groups of students

Learning Styles	7:30-9 Am Class	2:30-4 Pm Class	Total	Percent
Visual	18	28	46	46
Auditory	23	13	36	36
Tactile	9	9	18	18
Total	50	50	100	100%

The table reveals that forty-six percent (46%) of the students can learn effectively when they can visualize the lessons that are delivered to them. This implies that the teacher should teach with actions and provide instructional materials like video tapes that enhance the learning capabilities of students. It can be seen also that 36 or 36% of the students can learn better if they listen well to the teachers' lectures. They can learn with music background and through other forms or instructional strategies that provides opportunities for them to learn through listening. Lastly, 18 or 18% of the students said that they can learn better if they are involved in the discussion or they must always given the opportunity to share their part in classroom activities like dramatizing, group works, team working and others. In this case, teachers should vary the strategies so that the individual interest, strengths, and weaknesses of students can be discovered.

Table 2 presents the levels of study habits of the students in learning their lessons particularly in College Algebra

Study periods	3 hours High	2 hours Average	1 hour Low	Mean	Description
Hours spent in studying daily lessons in Mathematics	10	49	41	1.70	Average
Supplemental and Advance Reading based on syllabus	8	40	52	1.59	Low
Hours in solving their homework /assignment	15	75	10	2.05	Average
Total grand mean				1.78	Average

Based on the table, it shows that the students displayed a mean of 1.78 which means "Average study habit "in learning their lessons in studying their lessons in College Algebra. The students spent at least two hours or average study habit in solving their assignments as shown by the computed mean of 2.05. In studying their lessons they also do it in at least two hours or an average study habit which is supported by the obtained mean of 1.70. On the other hand, the students had a mean of 1.59 which is described as "low study habit" in doing advance reading and supplemental materials. Results of this imply that most of the students do not have strong courage to study.

Table 3 presents the level of study habits as practiced by the students for both gender

Indicators	Study period in hours				
	3hrs. High (2.34-3.00)	2hrs Average (1.66-2.33)	1hr Low (1.00-1.66)	Weighted Mean	Description
	Female ,n= 60				
Hours spent in studying daily lessons in Mathematics	6	29	25	1.7	Average
Supplemental and Advance Reading based on syllabus	4	28	28	1.6	low
Hours in solving their homework	10	50	6	2.05	Average
Sub Mean				1.78	Average
	Male ,n=40				
Hours spent in studying daily lessons in Mathematics	4	20	16	1.7	Average
Supplemental and Advance Reading based on syllabus	5	12	23	1.55	low
Hours in solving their homework/ assignments	5	25	4	2.05	Average
Sub Mean				1.77	Average
Total grand mean				1.78	Average

It is observed in table 2 that the students had an average study habit which is summarized by the computed mean of 1.78. Among the indicators, the students got a highest computed mean of 2.05 in the number of hours in studying their lessons. The manifestation exhibited by the students show that they do less in study period. Both the male and female group of students display an average mean of 1.78 which means "Average study habit." This means that they do not exert efforts in reviewing their lessons in Math particularly Algebra since in Mathematics two hours study period is not enough. In studying supplemental and advance reading based on syllabus he female group had an average mean of 1.66 which mean "low study habit" and so with the male group who got a mean of 1.55 which means "low study habit." This is true because some of them hardly absorbed the knowledge even if the teacher keeps on emphasizing the lessons by chalk –talked and drilling on the problems and solutions of the lessons they still tend to forget and don't get passing scores during quizzes and exercises .

The study is also similar to the study conduct by

Table 4 presents the academic performance of the students in Algebra

Description Performance levels	Students	Percent	Mean
High	15	15	2.15- Average
Average	50	50	
Low	35	35	
	100	100	

The table reveals that the students in College had an" average performance" as evidenced by the computed mean of 2.15. Specifically, there are 50 % of them who falls under average performance, 35% of them are falling within" low performance." While only 15% of them have "high performance."These results shows that the students' learning need to be reinforced by introducing some various related activities that can make them more interested to engage in learning College Algebra, like weekends quiz bee contest, seminars in word problem solving ,and Math projects.etc.

Table 5 presents the learning styles and academic performance of the students in College Algebra as to whether there is a significant relationship.

Learning Styles	Academic Performance			
	High	Average	Low	Total
Visual	8	20	18	46
Auditory	5	20	11	36

Tactile	2	10	6	18
Total	15	50	35	100

X^2-test at .05 level of significance = 9.49, Chi-square test = 33.43, Decision: Reject Ho.

The table reflects that the computed value of Chi-square is 33.43 which is greater than the Chi-square tabular of 9.49 at .05 level of significance. Thus, the null hypothesis that there is no significant relationship is rejected. This implies that the study habits of the students in College Algebra have great impact to their performance in the said subject. Students are then described to be more on visual and auditory form of learning as compared to the tactile.

The result of this study is also similar to the study of Rochford (2003) which has provided a few excellent studies recently on the value of using learning styles information to improve both classroom pedagogy and the study habits of students. The findings of her study suggested that the learners desired more on visual and auditory style of learning.

Table 6 presents the areas in College Algebra that the students felt need for remedial class

Group of students	Areas	Frequency	Percentage
Morning(7:30-9)	• Algebraic Expressions • Polynomials • Rational Expressions • Synthetics Division • Rectangular Coordinate System • Simple Equations • Systems of Equations and problem solving • Quadratic Equations	20 21 23 30 15 15 35 30	20 21 23 30 15 15 35 30
Afternoon(2:30 – 4)	• Algebraic Expressions • Polynomials • Rational Expressions • Synthetics Division • Rectangular Coordinate System • Simple Equations • Systems of Equations and problem solving • Quadratic Equations	25 27 30 35 20 18 30 35	25 27 30 35 20 18 30 35

The table reflects that there are 35 or 35% of the students need remediation on the following areas: synthetic division and quadratic equations, and systems of equations with

problem solving. There are 30 0r 30 % of the students need remediation on the areas like: Rational expressions and equations. Polynomials and Algebraic expressions also are areas where students need remediation.

This finding is parallel to the study published by OPPAGA in 2007, the related study should that 55% of all of the students entering Florida postsecondary institutions require remediation in mathematics, reading, and/or writing; 94% of students who need remediation attend community colleges. Florida law permits that only the state's 28 community colleges and one Florida University (Florida A&M) offer college preparatory classes. Based on the same OPPAGA study, 55% of all traditional-aged students, 18 years of age and younger, are not college-ready when entering Florida's community colleges.

CONCLUSIONS

This study found out that forty-six percent (46%) of the students are have desirable learning through visual style of the learning, thirty-six percent prefer auditory learning and only 18% of them prefer tactile style of learning. On the hand, it is observed in table 2 that the students had an average study habit which is summarized by the computed mean of 1.78. Among the indicators, the students got a highest computed mean of 2.05 in the number of hours in studying their lessons. On the students' performance, it was noted that the students in College Algebra had an" average performance" as evidenced by the computed mean of 2.15. Specifically, there are 50 % of them who falls under average performance, 35% of them are falling within" low performance." While only 15% of them have "high performance."

In the assessment of whether there is a significant difference of the study habits and the performance of the students, the null hypothesis that there is no significant relationship is rejected. This implies that the study habits of the students in College Algebra have great impact to their performance in the said subject. Students are then described to be more on visual and auditory form of learning as compared to the tactile. When asked if what areas do they students need remediation in learning College Algebra, they reflected that: 35% of the students need remediation on the following areas: synthetic division and quadratic equations, and systems of equations with problem solving. There are 30 0r 30 % of the students need remediation on the areas like : Rational expressions and equations. Polynomials and Algebraic expressions also are areas where students need remediation.

RECOMMENDATION

Based from the survey, the following are recommended:

1. That teachers should be aware of the learning styles of their students in order to be able find means of making their teaching effective to the learner's level ,character, and learning readiness;
2. Students must also be aware of their learning style and use it to enhance their learning capabilities in College Algebra;
3. Students should be provided with various opportunities to learn through the teaching strategies that match their learning style;
4. The students must be reminded to established their study habit to keep them be aware of their academic responsibilities to achieve a higher performance level ;
5. Remediation in Mathematics instruction to average and low performers in College Algebra should be done to reinforce the weak foundation of students in College Algebra.

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