

LEARNING STYLES AND ACADEMIC PERFORMANCE OF GRADE 11 HUMSS STUDENTS IN EARTH AND LIFE SCIENCE IN TITAY NATIONAL HIGH SCHOOL: BASIS FOR INSTRUCTIONAL DEVELOPMENT PLAN

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Abstract

The study was undertaken to determine any significant difference in learning styles and academic performance. Specifically, it answered the following questions: 1.) What is the learning style of the respondents? 2.) What is the level of academic performance of Grade 11 HUMSS (Humanities and Social Sciences) Students? 3.) Is there a relationship between learning styles and academic performance of the respondents? 4.) Is there a significant difference between learning styles and academic performance when respondents are grouped according to profile? 5.) On the basis of findings, what instructional development plan can be designed? The researcher was able to utilize quantitative descriptive design to answer the research questions of the study. Moreover, this study also utilized another type of research design, the correlational study. It is used to find out the association between two or more variables. The study revealed that the respondents of the study have moderately applied visual, auditory and kinesthetic learning. However, the highest and lowest grade among respondents is 98 and 82, respectively which has a verbal description of Outstanding and Average, respectively. The mean of the academic performance of the respondents is 91.00 with a standard deviation of 2.900 and verbal description of Very Good. The results of Pearson r correlation coefficient between the learning style and the academic performance revealed that the learning styles of the respondents in terms of visual learning with $r = -0.341$ has moderate and positive correlation with the academic performance of the students p -value of 0.031** with an assumed alpha level of significance at 0.05. The findings revealed that the significant difference does exist in the learning style in terms of kinesthetic learning ($t = 2.102$) with p values lesser than $\alpha = 0.05$ level of significance when the data is analyzed according to the respondent's gender. Moreover, the result of t -test uncorrelated in the learning style when the data is analyzed according to the ethnicity of the respondents. As disclosed in the findings, the significant difference does exist in the learning style in terms of visual learning ($t = 2.814$) with p values lesser than $\alpha = 0.05$ level of significance. The data imply that the socio-economic status has no significant bearing on the learning style of the respondents. An instructional development was proposed.

Key Words: Learning Styles, Academic Performance, Demographic Profile, Sex, Ethnicity, Socio-economic Status, Instructional Development Plan

1. INTRODUCTION

Education is the most powerful tool any individual can utilize in creating change may it be within themselves, family or the community. It provides lifetime empowerment both for men and women and opportunities for them to nourish every single drop of learning they obtained from the academic community.

This serves as a ticket to a competitive world where your ideas, opinions and skills really matter. According to Clark (2015), education serves an essential responsibility in our community. It is the fundamental aspect which every mankind has the right to access. Ancient philosophers pioneered the advent of education and through their contributions to humanity it became an anchor of how broad our learning as of this modern time. Education will always start from home and parents are task to educate children about discipline, behavior and manners.

Each learner is special in his or her own strengths and disputes and it is the task of every teacher to promote effective individualized learning in response to the learner, BrandenBerger (2014). Since learners are individually different in terms of their skills and talents, learning style can be the basis in improving the teaching-learning process. According to Keete (1979), learning style involves three important domains such as mentally, emotionally and physically behaviors that serve as proportionately steady indicators of low learner's perceptions, connect with, and participate to the learning habitat.

To support this idea, Steele (2007) emphasizes the relevance of nurturing learners with light disorder in the whole education learning room applying the conventional curriculum. Kaptan (2012) emphasized that most of the students nowadays are experiencing learning problems due to different factors specifically in comprehending science concepts that needs difficult mental abilities that involves numerical skills, analytic thinking, assessing, analyzing and explaining facts and applying Higher Order Thinking Skills (HOTS) which is challenging for students with learning problems. With the paradigm shift of the educational system in the Philippines, Senior High School was offered in Titay National High School. It is one of the pioneering public institutions implementing the Enhanced Basic Education Program as mandated under the Republic Act No. 10533 also known as the "Enhanced Basic Education Act of 2013". Its prime objective is to implement an efficient basic educational curriculum that can provide high competent and skilled law abiding residents prepared with the important capabilities and expertise for both long-lasting learning and profession.

In addition, Earth and Life Science is one of the minor courses of K12 Basic Education Curriculum and its description focus to produce an over-all history for the comprehension of Earth Science and Biology. It shows the background of the Earth over geologic period. It describes the Earth's internal features, formations, and mechanism. Issues, concerns, and problems pertaining to natural hazards are also included. It also deals with the basic principles and methods in the principles of biology. It involves biological processes and activities at the cellular, organism, population, and ecosystem levels. Students' learning styles in this subject should be identified.

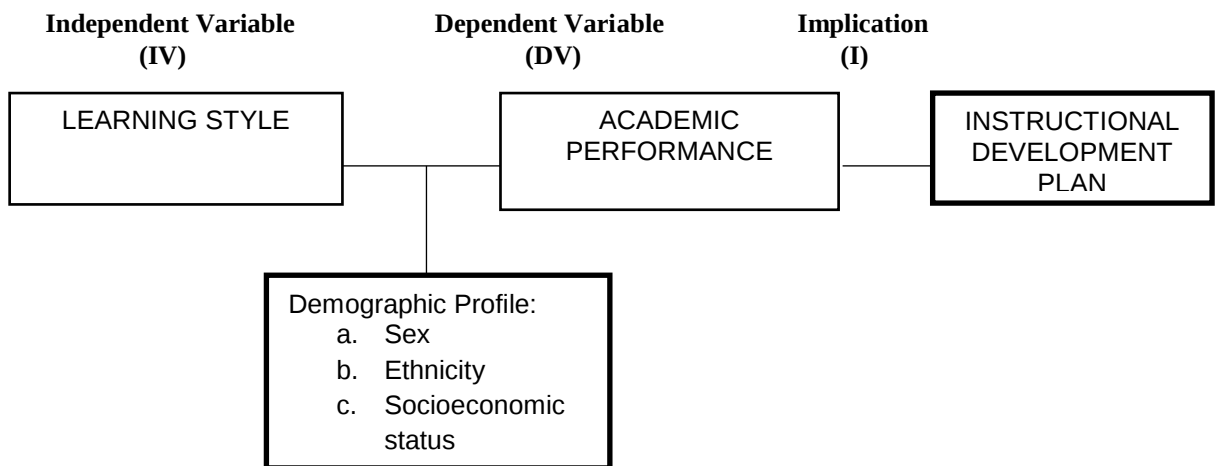
In the span of three years since senior high school curriculum was implemented, many problems and challenges were encountered. One of this is to address the needs of every learner on what appropriate teaching strategies can be used to their learning styles. Titay National High School is the center of senior high school curriculum in the municipality of Titay, Zamboanga Sibugay that offers academic and technical vocational tracks. As of the first semester of school year 2018-2019, it has 110 enrolled HUMSS students and it is 45 % of the total population of enrolled Grade 11 students. In line with this premise, the researcher was able to identify the learning styles and academic performance and made an instructional development plan through this study for the **LEARNING STYLES AND ACADEMIC PERFORMANCE OF GRADE 11 HUMSS STUDENTS IN EARTH AND LIFE SCIENCE IN TITAY NATIONAL HIGH SCHOOL: BASIS FOR INSTRUCTIONAL DEVELOPMENT PLAN**. The study could be basis for curriculum implementers, supervisors, school principals, and teachers of different secondary schools offering senior high school curriculum, and future researchers in considering the learning styles and relationship of academic

performance of learners in order to use it as an implication to improve the instructions in a classroom setting. This may also be the baseline in improving the performance of teachers from classroom instruction, facilities, and activities.

2. CONCEPTUAL FRAMEWORK

Through investigation of variables present in the conceptual framework as shown in Figure 1, the researcher aimed to reach the point of formulating intervention based on their demographic profile, preferred learning styles and its correlation to their academic performance.

The conceptual framework of the study is presented in the conceptual scheme illustrated in Figure 1.



3. METHODOLOGY

Research Design

The researcher was able to utilized quantitative descriptive design to answer the research questions of the study. Descriptive research purpose is to describe, observe and record aspects of a instances as it occurs naturally. This includes the collection of information that will give a description or an account of individual personalities, groups or situations (Polit and Hunger, 1999). Moreover, this study also utilized another type of research design, the correlational study. It is used to find out the association between two or more variables (Tan, 2014).

Research Locale

This study was conducted in Titay National High School. Titay National High School is governed by Department of Education and a qualified urban secondary public school located in Purok Mauswagon, Titay, Zamboanga Sibugay with geographic coordinates of 7°51'56"N and 122°33'36"E). Titay, Zamboanga Sibugay is officially the second populated municipality of the province. It is a second type municipality in the province of Zamboanga Sibugay, Philippines. From the data recorded in the 2015 census, it has a population of 49,673 people. May 24, 1959 was the founding date that was declared as a separate municipality on, by virtue of Executive Order No. 395. After the declaration as a municipality, The first public school in Titay was founded in July 8, 1968 and it is now on its 50th year of delivering quality secondary education to the residents of Municipality of Titay and its neighbouring areas.

Junior and senior high school curriculum were offered which includes academic and technical vocational track such as Accountancy, Business and Management (ABM), Humanities and Social Sciences (HUMSS), TVL-Information and Communications Technology, TVL-Electrical Installation and Maintenance, TVL-Cookery/BPP, TVL-Shielded Metal Arc and Welding, TVL-Agri-crop Production, TVL-Beauty Care. The school also plans to offer Science and Technology, Engineering and Mathematics (STEM) as an additional academic track for the S.Y. 2019-2020. The Senior High School of Titay National High School have a total of nineteen (19) teachers, one (1) Assistant School Principal, one (1) Master Teacher I, five (5) Teacher III, twelve (12) Teacher II, and one (1) Teacher I. Based from the Learners' Information System (LIS) as of first semester of S.Y. 2018-2019, 413 were enrolled learners in Grade 11 and 302 enrolled in Grade 12 with total population of 715 enrolled senior high school students.

Population and Sampling Design

The respondents of this study were forty (40) Grade 11 HUMSS Section A students of Titay National High School in which twelve (12) were males and twenty eight (28) were females. A total enumeration was utilized to get the number of the respondents. The table below shows the administering of the respondents in this study

Table 1
Distribution of the Respondents

Grade Level		Population
Grade 11 HUMSS Sec. A	Male	12
	Female	28
TOTAL RESPONDENTS		40

Reliability and Validity of the Research Instrument

After many attempts to create the survey instrument and spent so much time on constructing and meetings during the corrections of drafts by the adviser, finally the survey tool has been completed through the suggestions of the panel. However, the panel committee members had suggested the researcher to look for a sample standard survey questionnaire focusing on the VAK learning styles. After browsing the internet and with the help of the adviser, the fitted tool has been found and studied to check if the questionnaire is congruent to the research objectives.

The questionnaire is divided into two parts: Part A is about Demographic Profile that includes sex, ethnicity, and socioeconomic status (Please see Appendix A). Part B of the questionnaire was adopted from the study of O'Brien (1985) in his study on the modality of learning channel preference. The survey instrument was validated by the research panel and was pilot-tested to ten (10) respondents which were not part of the research to ensure reliable and valid questions. In terms of reliability, the researcher applied Cronbach's alpha test to measure the coefficient of reliability or consistency that resulted 0.841 which it means high reliability.

Data Gathering Procedure

Before implementing the questionnaire to the chosen respondents, face and content validation of questionnaire by the panel members and experts. Then, a pilot testing for ten (10) students was conducted. The members of the panel may suggest for any revisions. A letter of permission was addressed to the Schools Division Superintendent of Zamboanga Sibugay and School Principal of Titay National High School. It took almost three (3) weeks when the letter of permission was approved, the researcher asked for master list of the Grade 11 HUMSS Section A students from the class adviser.

The respondents were then oriented with the objectives of the study, confidentiality agreement and how to respond the survey form. The researcher encountered problems in gathering the data. Some of the respondents did not completely filled up the survey questionnaire, some were not focus and attentive. However, these problems were directly solved by the researcher and successfully collected all the forty (40) survey forms. The data was gathered by the researcher through statistical treatment and submitted it to statistician.

Statistical Tools

The data retrieved were collected, analyzed, and interpreted by the statistician as officially mandated.

1. For problem 1, the researcher utilized weighted arithmetic mean in order to determine the learning styles of the respondents.
2. For problem 2, weighted mean was used to determine the academic performance of Grade 11 HUMSS students.
3. For actual research findings of problem 3, the researcher applied Pearson r to determine the significant relationship between learning style and academic performance.
4. For problem 4, T-test uncorrelated was used for the gender and one-way ANOVA was applied to determine the significant difference when the other variables of profiles of the respondents were considered.

4. RESULTS AND DISCUSSION

The first research question that this study sought to answer is, “*What is the learning style of the respondents?*”

Table 2 presents the mean scores, overall weighted mean and verbal description of learning styles of respondents in terms of visual learning.

Table 2
Learning Style of the Respondents in Terms of Visual Learning

Visual Learning	Mean	Verbal Description
1. I remember something better if I write it down.	3.02	Moderately applied
2. I get lost or am late if someone tells me how to get to a new place, and I don't write down the directions.	4.17	Much applied
3. When trying to remember someone	3.10	Moderately applied
4. If I am taking a test, I can “see” the textbook page and where the answer is located.	3.65	Much applied

5. It helps me to look at the person while listening; it keeps me focused.	2.45	Less applied
6. Using flashcards helps me to retain material for tests.	3.77	Much applied
7. It's difficult for me to understand when the surrounding is noisy such as when there are people talking or music playing and I cannot catch up what the person is saying.	3.00	Moderately applied
8. It is difficult for me to comprehend a when someone tells me a joke.	3.75	Moderately applied
9. It is better for me to get work done in a quiet place.	2.42	Less applied
10.	4.20	Much applied
Overall Weighted Mean	3.48	Moderately Applied

Legend: 4.50 – 5.00 very much applied
 3.50 – 4.49. much applied
 2.50 – 3.49 moderately applied
 1.50 – 2.49 less applied
 1.00 – 1.49 not applied at all

As shown in the table, the respondents have much applied visual learning style when they write down the directions so they won't get lost or late in getting to a new place (4.17), statement 10 (4.20), when they see the textbook page and where the answer is located when they take a test (3.65) and when they use flashcards in retaining materials for test (3.77). They have moderately applied visual learning styles when they remember something better when writing down (3.02), when trying to remember someone (3.10), when they don't understand a person is saying while music is playing or people are talking (3.00) and when someone is saying a joke (3.75). They have less applied visual learning styles when they look at the person while listening to help them focused (2.45) and when they work in a quiet place (2.42).

To sum up, the overall weighted mean of 3.48 shows that respondents have moderately applied visual learning styles. This is consistent with the studies of Saad (2017), Yemane (2017), Rahman & Ahmar (2017), Yang and Lu (2018) and Gilakjani (2011).

It was found out that majority or 91% of the learners has utilized single sensory modality which is visual learning style (Saad, 2017). One hundred five (105) or 25.3% of the students uses visual mode of learning Accounting (Yemane, 2017). There was also a test that showed how visual and auditory learning styles are dominant. Learners tend to learn through visual aids such as charts, graphs and diagrams (Rahman & Ahmar, 2017). Nzesei (2015) also found out visual modalities as one of the strong learning styles among respondents which also includes auditory and kinaesthetic learning styles. Same results were revealed when higher scores are obtained by visual learners through high and medium concentration compared to those with low concentration (Yang and Lu, 2018). Gilakjani (2011) also concluded that the prevalent learning style among EFL students at the Islamic Azad University of Lahijan, Iran was visual one. Abu-Ayyash and Assaf (2016) has found out 50% of the respondents are visual learners. Peresamy, Suryana and Govindan (2009) found out that the most dominant learning style is visual.

There are learners who prefer to combine visual learning style. They find it convenient and easy to acquire concepts when they combine this style with other modalities such as the findings of Karalliyadda (2017) where 50% or half of the respondents prefer to combine Visual with Reading and Kinesthetic modes.

However, results of Chaudhary et al. (2015) are contrasting with the findings where they revealed the scores for visual styles of 4.28 behind other learning styles of 4.91, 4.54 and 4.75 for Auditory, Reading and Kinesthetic learning styles, respectively. On the other hand, only ten students or 29.41% of the respondents have a visual learning style (Rahman and Ahmar, 2017).

The results for visual learning style can be credited to teachers who manipulate instructional materials through Power Point presentations and other visual aids. Jotting down notes, reflective journals and creation of scrap books could also be determining factors that respondents have utilized visual modality as their learning style in Earth and Life Science.

Table 3 presents the mean scores, overall weighted mean and its corresponding verbal description of auditory learning mode.

Table 3
Learning Style of the Respondents in Terms of Auditory Learning

Auditory learning	Mean	Verbal Description
1. My written output is far from me. My papers have crossed-out erasures and words.	2.95	Moderately applied
2. I am convenient to use my finger all the time as a pointer when reading to keep my place.	3.57	Much applied
3. Papers with little small print, blotchy dittos or poor copies are too hard on me	3.37	Moderately applied
4. I understand how to do something if someone tells me, rather than having to read the same thing to myself.	3.27	Moderately applied
5. I don't forget things that I hear, rather than things that I read or see.	2.95	Moderately applied
6. Writing is boring and tedious for me. I press down too hard with my ball pen or pencil	3.15	moderately applied
7. I always experienced getting tired of my eyes fast, even though the eye specialist says	2.60	Moderately applied
8. When I read, I mix up words that look alike, such as "them" and "then", "bad" and "dad."	2.75	Moderately applied
9. It's hard for me to read other people's handwriting.	3.10	Moderately applied
10. If I had the choice to learn new information through a lecture or textbook, I would choose to hear it rather than read it.	3.10	Moderately applied
Overall weighted mean	3.08	Moderately applied

Legend: 4.50 – 5.00 very much applied
 3.50 – 4.49. much applied

2.50 – 3.49	moderately applied
1.50 – 2.49	less applied
1.00 – 1.49	not applied at all

As shown in the table, respondents have moderately applied auditory learning style when their written output is far on them and papers have crossed-out erasures and words. (2.95), and when papers with little small print, blotchy dittos or poor copies are too hard on them (3.37), when they understand something from someone whole tells them rather than having to read the same thing to themselves (3.27), when they remember things that they hear than things that they see or read (2.95), when writing is tiring and they press down too hard with their pens or pencils (3.15), when their eyes get tired fast even if the doctor says (2.60), when they read they mix words that look alike such as “them” and “then”, “bad” and dad” (2.75), when it’s hard for them to read other people’s handwriting (3.10) and when they had the choice to learn new information through a lecture or textbook (3.10). Respondents have much applied auditory learning styles when they use fingers as a pointer when reading to keep their place (3.57).

To sum it up, the overall weighted mean of 3.08 shows that respondents have moderately applied auditory learning styles. The findings conform with findings of Saad (2017) where 91% of the learners has utilized single sensory such as modality. Gilakjani (2011) found out that 35% of the students preferred auditory mode of learning. Castolo and Rebusquillo (2007) also found out that learners learned best by oral or auditory learning style compared to visual and kinesthetic learning styles. Chaudhary et al. (2015) revealed the mean scores for auditory learning style at 4.91 ± 0.08 compared to visual styles of 4.28 ± 0.09 , 4.54 ± 0.07 , and 4.75 ± 0.09 for Visual, Reading and Kinesthetic learning styles, respectively.

Although studies of Abu-Ayayash and Assaf (2016) and Mohammadi, Mohammadi, Mobarhan and Ferns (2015) showed other modalities to be dominant, auditory style is still utilized. For an instance, the Class I respondents of Abu-Ayayash and Assaf (2016) found out that 42% of the learners are kinesthetic. However, 35% of the learners used auditory modality compared to visual learners at 23. Mohammadi, Mohammadi, Mobarhan and Ferns (2015) has found out a reading-writing at highest mean of 5.53 ± 1.95 . Auditory learners were found next in rank at a means score of 4.18 ± 1.80 . Nzesei (2015) also found out auditory modalities as one of the strong learning styles among respondents which also includes visual and kinaesthetic learning styles.

This in contrast with the findings of Gonzales & Reyes (2016) where auditory modality is sometimes used by the Liberal Arts students of Polytechnic University of the Philippines. The respondents of Abu-Ayyash and Assaf (2016) for Class II showed only 15% of respondents as auditory learners.

This shows that although auditory modality is moderately applied by respondents at 3.08 compared to visual learners at 3.48, they still acquire learning through lectures and information through reading. Activities such as vocabulary activities, lectures and student oral presentations have moderately helped learners summarize or reinforce key concepts and essential understanding.

Table 4 shows the mean scores, overall weighted mean and its corresponding verbal description of learning styles of respondents in terms of kinesthetic learning

Table 4 Learning Style of the Respondents in Terms of Kinesthetic Learning

Kinesthetic Learning	Mean	Verbal Description
1. I do not like to read instructions and directions; I would prefer just start doing it.	2.17	Less applied
2. I easily learn when I am shown how to do and finish something, and when I have the opportunity to do it.	3.72	Much applied
3. Studying at a desk is not for me.	2.67	Moderately applied
4. I love to solve different problems through a specific trial-and-error approach, rather than from the method of step-by-step.	3.00	Moderately applied
5. Before I follow directions, it helps me to see someone else to do it first.	3.32	Moderately applied
6. I always find myself the need of frequent breaks while doing homework and studies.	3.47	Moderately applied
7. I am not equipped in giving verbal directions and explanations.	3.20	Moderately applied
8. Even in strange surroundings, I do not become easily lost.	3.10	Moderately applied
9. When I have the freedom to move around, I can easily think well.	3.77	Much applied
10. I'll use my hands a lot and call something a "what-cha-ma-call-it" or a "thing-a-ma-jig", when I can't think of a specific word.	2.90	Moderately applied
Overall weighted mean	3.13	Moderately applied

Legend: 4.50 – 5.00 very much applied

3.50 – 4.49. much applied

2.50 – 3.49 moderately applied

1.50 – 2.49 less applied

1.00 – 1.49 not applied at all

As shown in the table, respondents have much applied kinesthetic learning when they are shown how to do something and they have opportunity to do it (3.72) and when they think well when they have freedom to move around (3.77). They have moderately applied kinesthetic learning when they are studying at a desk which is not for them (2.67), when they tend to solve problems through a trial-and-error approach rather than step-by-step method (3.00), when before following direction it would help them to see someone else do it first (3.32), when they find themselves needing frequent breaks while studying (3.47), when they are not skilled in giving verbal explanations or directions (3.20), when they do not become easily lost even in strange surroundings (3.10) and when they can't

think of a specific word they use their hands a lot and call something a “what-cha-ma-call-it” or a “thing-a-ma-jig” (2.90). They have less applied kinesthetic learning when they don’t like to read directions and just start doing (2.17).

To sum it up, the overall weighted mean of 3.13 shows that respondents have moderately applied kinesthetic learning styles.

This conforms to the study of Ayyash and Assaf (2016) wherein kinesthetic learners are dominant in Class I at 42%. Karalliyadda (2017) revealed 88% of the respondents as kinesthetic learners. When combining various modalities, a mixture of Auditory and Kinesthetic modality at 53% was still prominent. Kinesthetic modality of learning has a share in each main learning style. This shows that respondents have a higher preference to learn through experience. Majority of the students have strong visual, auditory and kinesthetic modalities (Nzesei, 2015).

The composite mean of 2.69 from the study of Gonzales & Reyes (2016) among Liberal Arts students prefer to kinesthetically or by tactile modality. Active and reflective learning are both used by Arabic students compared to Turkish and Cypriot nationalities (Gunduz and Ozcan, 2010).

Then learners enjoy experiential learning such as hands-on activities they exhibit a higher preference for kinesthetic modality of learning. The mean of 3.13 compared to visual modality of 3.48 would mean activities such as moving from station to station within room, allowing students to move about the room and using technology tools available in the classroom to complete their tasks is somehow evident in classroom instruction.

However, findings of Mohammadi, Mohammadi, Mobarhan and Ferns (2015) is contrasting with the results where kinesthetic learning styles have a mean of 2.61 ± 1.64 compared to the means of visual, auditory and reading-writing at 4.18 ± 1.80 , 5.53 ± 1.95 and 3.80 ± 1.83 , respectively. This corresponds to 4.44% of his respondents who were kinesthetic learners.

The means of auditory, visual and kinesthetic modality shows that learners have moderately applied these three learning styles. This means that neither of the three is less or much applied. The abilities of the respondent could therefore switch from one style to another depending on the scenarios of classroom instruction. This is consistent with the findings of John, Khan and Shahzadi (2016) where majority of the students have close balance between all the learning styles. Jiraporncharoen et al. (2015) also found out an equal share of learning preferences in terms of active/reflective learning and sensing/intuitive learning among preclinical and clinical students. The academic performance of students does not exhibit preference for specific learning style and they demonstrate almost equal preferences for all the learning styles. Overall, it is concluded from the findings that every student use the different learning style which are personally unique to them.

The second research question that this study sought to answer is, “*What is the academic performance of the Grade 10 respondents?*”

Table 5 presents the level of academic performance of the respondents.

Table 5

Level of the academic performance of the respondents

Academic performance				
Lowest mean grade	Highest mean grade	Mean	SD	Verbal description
82.00	98.00	91.00	2.900	Very good

Legend:	96 and above	outstanding
	90 – 95	very good
	86 – 89	good
	80 – 85	average
	75 – 79	below average
	Below 75	failed

As shown in the table, the highest and lowest grade among respondents is 98 and 82.00, respectively which has a verbal description of Outstanding and Average, respectively. The mean of the academic performance of the respondents is 91.00 with a standard deviation of 2.900 and verbal description of Very Good. The results showed how students of Humanities and Social Sciences are performing well in their Earth and Life Sciences in Titay National High School based on the standards set by DepEd Order No. 36 Series of 2016.

This is contrasting with the findings of Castolo and Rebusquillo (2007), and Gonzales and Reyes (2016). Most of the respondents received a general average of 81 to 85%. This indicates that most the learners are average learners (Castolo and Rebusquillo, 2007). Respondents of Gonzales & Reyes (2016) got weighted average of 2.37 which means they have a satisfactory performance.

This clearly shows that the Humanities and Social Sciences students performed excellently in their Earth and Life Sciences subject because they have developed styles based on the facilities of the school and strategies employed by teachers.

The third research question that this study sought to answer is, “***Is there a significant relationship between the learning styles and the academic performance of the grade 10?***”

Table 6 presents the significance of the relationship between the learning styles and academic performance.

Table 6

Significance on the Relationship between the Learning Style and Academic Performance

X (Independent Variable) Learning style	Y (dependent Variable)	r-value	Verbal Description	P-value	Decision on Ho
Visual	Academic Performance	0.341	Moderate correlation	0.031**	Reject
Auditory		-0.085	Negligible correlation	0.601	Accept
Kinesthetic		-0.225	Negative Low correlation	0.086	Accept

**Significant at 0.05 level of significance*

The results of Pearson r correlation coefficient as analyzed through their the learning styles and academic performance revealed that the learning styles of the respondents in terms of visual learning with $r = -0.341$ has moderate positive correlation with the academic performance of the students at p-value of 0.031** with an assumed alpha level of significance at 0.05. The r values of the variables indicate that the moderate positive correlation (learning style -visual) (X) are established with academic performance (Y). In support, the p values of the variables which are lesser than assumed alpha of .05 level of significance concludes that the significant correlation does exist. The magnitude of association between the two variables in terms of visual learning is correlated with their academic performance. The data suggest that the students who have high level of visual learning are most likely to have a high academic performance.

However, auditory learning and kinesthetic leaning of the respondents are not significantly correlated to their academic performance with r value of -0.085 and -0.225, respectively. It has p values greater than 0.05 level of significance. Hence, the hypothesis is accepted since there is no significant correlation between the two variables. It can be inferred from the data that the independent variable has no significant bearing to the academic performance.

The results of findings revealed a positive correlation of visual modality and academic performance wherein when academic performance increases, the visual modality increases. This is opposite with the negative correlation of Gonzales & Reyes (2016) wherein p-value is less than 0.05 level of significance. This implies that academic performance and auditory learning style are

correlated with each other. Hence, when there is an increase of academic performance, it is expected to have a decreasing auditory modality. Furthermore, it implies that learners performing well in academics don't prefer to use auditory mode of learning or uses auditory learning rarely.

The positive correlation of visual learning and academic performance conforms to the study of Yeung (2005). It has shown unambiguously that the Feeling/Thinking dimension which uses senses such as visual and auditory modality has an effect on the academic performance of Chemistry students specifically towards outperformers. Rhamani (2012) revealed a positive correlation for intuitive learning, reflective learning and active/reflective learning. There is a significant association when grades are associated with their learning style preferences (Akhlaghi1, Mirkazemi1, Jafarzade and Akhlaghi, 2018).

Based from the results of Gonzales & Reyes (2016), the computed r-values indicate moderate negative correlation when establishing relationship between learning styles and academic performance.

However, this is contrasting with the findings of Jiraporncharoen et al. (2015) wherein there is no association between academic achievement and visual, verbal, sensing and intuitive learning styles. Karalliyadda (2017) presented no significant association with semestral grades and preferred learning styles. The One-way ANOVA test also resulted to no association with academic achievement and learning concentration i.e. visual and verbal styles (Yang and Lu, 2018). There is also no significant relationship between academic achievement and score in various dimensions in their learning styles (Yeung, 2005). John, Khan and Shahzadi (2016) indicates a no association between academic performance and learning styles. Rhamani (2012) established a negative correlation of sensing style and active style while Grade Point Average has nothing to do with their learning style preferences. There was also no significant difference established in sensory modality of unimodal learners (Akhlaghi1, Mirkazemi1, Jafarzade and Akhlaghi, 2018). Chi-square test of Rahman & Ahmar (2017) showed that learning styles has nothing to do with academic achievement of freshmen students in Indonesia.

The fourth research question that this study sought to answer is, “***Is there a significant difference in the learning styles of the grade 10 when the data is analysed according to their profile?***”

Table 7 presents the test of difference in the learning styles when grouped according to their gender.

Table 7

Significance on the Difference in the Learning Style in Terms of Gender

Variables	Overall Mean Rank		t-value	P value	Decision on Ho
	Male	Female			
Visual	3.41	3.51	-0.340	0.736	Accept
Auditory	3.14	3.05	0.689	0.495	Accept
Kinesthetic	3.34	3.04	2.102	0.042**	Rejected

**Significant at 0.05 level of significance*

Table 7 shows the results of t-test when data is analyzed according to the gender of the respondents. The findings revealed that the significant difference does exist in the learning style in terms of kinesthetic learning ($t=-2.102$) with p values lesser than $\alpha = 0.05$ level of significance when the data is analyzed according to the respondent's gender. In addition, the overall result of statistic when all the variables are taken jointly indicates that the significant difference does exist among the variables tested in the study; hence, the posited hypothesis is rejected since there is a statistical significant difference among the variables. Also, it is evidently shown in the mean ratings obtained by the student-respondents where they were categorized according to gender suggest that the male students are more inclined to kinesthetic learning style than the female.

Demographic variables such as age, gender and culture have an effect on learning styles. There must be a variety of teaching strategies to be used by teachers to ensure that students learn in different ways (Gunduz and Ozcan, 2010). Nzesei (2015) established the relationship of learning styles and academic achievement of the students through the Pearson Moment Correlation Coefficient and showed positive relationship with varying strengths ranging from 0.246 and 0.777. However, findings of Mohammadi, Mohammadi, Mobarhan and Ferns (2015) found a significant association between auditory ($P=0.026$) and reading-writing learning style of students with gender at p -value of 0.001 but no significant association was found between visual and kinesthetic learning style of students with gender.

In terms of visual and auditory, the significant difference does not exist when they were grouped according to their gender with t value of -0.340 and 0.689 with p value greater than 0.05 level of significance. The data suggest that the respondents both male and female don't differ much in their learning style along the area of visual and auditory.

Saad (2017) conducted Chi-square test to establish relationship between gender and learning preferences. According to Rahman & Ahmar (2017), the learning styles could not be influenced by learning achievement and gender.

Table 8 presents the test of difference in the learning styles when grouped according to their ethnicity.

Table 8

Significance on the Difference in the Learning Style in Terms of Ethnicity

Variables	Overall Mean Rank		t-value	P value	Decision on Ho
	Bisayan	Subanen			
Visual	3.32	4.24	-2.814	0.008**	Rejected
Auditory	3.10	2.97	0.915	0.366	Accept
Kinesthetic	3.18	2.90	1.647	0.108	Accept

**Significant at 0.05 level of significance*

Table 8 presents the result of t-test uncorrelated in the learning style when the data is analyzed according to the ethnicity of the respondents. As disclosed in the findings, the significant difference does exist in the learning style in terms of visual learning ($t=-2.814$) with p values lesser than $\alpha = 0.05$ level of significance when the data is analyzed according to the respondent's ethnicity. This shows that Subanen students are applies visual learning than Bisayan students. On the other hand, in terms of auditory and kinesthetic, the significant difference does not exist when they were grouped according to their ethnicity with t value of 0.915 and 1.647 with p value greater than 0.05 level of significance. This implies that both the Bisayan and Subanen learner either applies kinesthetic or auditory learning styles.

This is consistent with the findings of Saad (2017) where Malay, Chinese and Indian students prefer to become visual learners, Malay and Chinese prefer to be kinesthetic learners and Indian students prefer to be auditory learners. It was found out that culture has significant influence on learning style on individual's learning style. Authentic experiences are considered as factors influencing their styles compared to abstract concepts. This could be dure to cultural dimensions of an individual wherein uncertainty, perceived orientation, performance and institutional oneness provides abstract learning styles (Joy and Kolb, 2001).

However, ethnicity and learning style preferences establishes significant relationship has no significant relationship. Additionally, Malay race are more inclined towards visual learning (Saad, 2017). Similar findings were revealed by Bosman (2015), where there were no significant differences in visual, auditory and kinesthetic learning styles and cultural or racial identities.

Table 9 presents the test of difference in the learning styles when grouped according to their ethnicity.

Table 9

Significance on the Difference in the Learning Style in Terms of Socio-economic Status

Variables	Overall Mean Rank		t-value	P value	Decision on Ho
	1000 0 below	Above 10000			
Visual	3.52	3.12	0.897	0.375	Accept
Auditory	3.10	2.87	1.248	0.220	Accept
Kinesthetic	3.15	3.00	0.665	0.510	Accept

**Significant at 0.05 level of significance*

As reflected in table 9 the result of t-test uncorrelated in the learning style when the data is analyzed according to the socio-economic status of the respondents. As disclosed in the findings, the significant difference does not exist in the learning style in terms of visual learning ($t=0.897$), auditory ($t=1.248$), and kinesthetic ($t=0.665$), with p values greater than $\alpha = 0.05$ level of significance. Hence, the null hypothesis is accepted since there is no significant difference among the variables tested in the study when the data is analyzed according to the respondent's socio-economic status. The data imply that the socio-economic status has no significant bearing on the learning style of the respondents.

This confirms the results of Castolo and Rebusquillo (2007) where academic performance of the respondents according to socio-economic status has a strong relationship. This shows that there is a lot of significant difference in academic performance when gr economic status.

5. CONCLUSIONS AND RECOMMENDATIONS

This chapter provides the conclusions based on the results and discussions. This section also offers recommendations based on the relationship of learning styles and academic performance of Grade 11 Humanities and Social Sciences students of Titay National High School as basis for instructional development plan.

Conclusions:

Based on the findings, the researchers would like to present the concluding remarks:

1. The respondents of the study have moderately applied visual, auditory and kinesthetic learning.
2. The academic performance of the students in Earth and Life Science is Very Good.
3. There is a significant relationship between kinesthetic learning styles and their academic performance. However, there is no significant relationship with academic performance in terms of visual and auditory learning styles.
4. There is a significant difference between males and females who are kinesthetic learners and between Subanen and Bisayan respondents who are visual learners. However, there is no significant difference between males and females in terms of visual and auditory learners, between Subanen and Bisayan respondents in terms of auditory and kinesthetic learners and when learners are grouped according to their socio-economic status.
5. Instructional Development Plan is proposed in this study as presented in Chapter V.

Recommendations:

Based on the conclusions, the following are the recommendations to help enrich the study:

For the School Heads. Through the intervention plan proposed in the study, this could affirm the school's commitment towards responding the learner's needs. This proves how school's curriculum should accommodate the 21st Century learners. The Instructional Development Plan should be implemented, sustained and evaluated regularly. This could help them in ensuring the authenticity of their learning and development of a lifelong learners.

For the Teachers. This could also become their focal point of assisting faculty members teaching not only science subjects as guide their in enhancing the instruction through evaluating learner's styles, provision of related activities and monitoring of their academic progress.

For the Students. They should explore their innate abilities or skills which could help them in academic performance. They should realize how they can acquire Science concepts by utilizing their learning styles. Each one of them is unique and there should never be a perfect formula for achieving higher grades.

For the Parents. They should become part of the school's efforts and activities in improving the academic progress of their children by becoming aware of their learning styles, finding ways to nourish their innate abilities and appreciate their significance in the learner's holistic development.

Other Researchers. Investigate the influencing factors among learners on their preferred learning styles, relationship between those factors and academic performance.

TABLE 10

Proposed Instructional Development Plan in Earth and Life Science for Humanities and Social Sciences (HUMSS)

LEARNING STYLE	STRATEGIES	REQUIREMENTS	EXPECTED OUTPUT
Visual	Creation of Power Point Slides with inclusions of videos or visual aids for each content standard Print media i.e. charts, diagrams, graphs, illustrations, photographs, tables mounted in Science laboratory or classroom Requiring students to bring their Science Journals where they keep their inputs and outputs i.e. side notes, journals and other memory aids Graphic organizers as culminating activity for each lesson which will	Provision of LED TVs in each classroom or Science Laboratory Educational videos Print media in Science Laboratory Graphic Organizers Worksheets Journal Notebooks	For each learning competency, the following are expected Power Points and videos for curriculum competencies covered in the learning area. Mounted print media of the science concept in Science Laboratory Set of worksheets with answer keys Learners are expected to: a. Increase attention and participation through videos, PPTs b. Submit learning journal

	require students to include all concepts acquired for the discussion of the chapter. Demonstrations of Science concepts in front of the learners Provision of worksheets which will help them guide as they assess student's acquired learning competencies		every quarter showing their progress charts and outputs
Auditory	Class reading of science concepts which will reinforce the key ideas of Sciences. Invite resource speaker to share relevant content in a conference or plenary session Use oral presentations as learners summarize or reinforce key concepts and essential understanding using Subanen or Bisayan language Conduct a debate on critical issues in Science	Science reading materials i.e. science articles, journals Science conference Debate Oral Recitations	Invitation of at least one (1) resource speaker to share relative contents on chosen learning competency for the semester At least one (1) debate camp on Science issues for the semester Accomplished scoring guide on oral presentations after group activities with the use of their mother tongue
Kinesthetic	Integrate laboratory experiments to deepen the concepts acquired by learners. Provide board works and solve context-rich problems	Laboratory Manual Laboratory Equipment Set of board works Computers Internet Science Olympics	100% accomplishment of the laboratory activities. Accomplished scoring guides on board works 2 lessons per quarter applying learning stations

	Conduct learning by stations Utilize computers in accomplishing assigned tasks Conduct Science Olympics which will test their physical and mental strength.		Science Olympics during Science month celebration (1 st semester) or during Earth hour (2 nd Semester)
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