IMPLEMENTATION OF ACADEMIC-STEM IN THE DIVISION OF BILIRAN

Lezil G. Ebina[1], Elvira S. Pecajas[2]

School of Graduate Studies

Biliran Province State University

lvpecajas@gmail.com

Abstract: **This study aimed to assess the implementation of Academic-STEM in the Division of Biliran. It utilized the descriptive-correlational method of research. This study was conducted on selected senior high schools in the Division of Biliran. The respondents of this study involved 30 teachers and 120 students from senior high schools. The schools offering Academic-STEM all throughout Division of Biliran confirmed that the implementation of Academic-STEM in terms of administration and management, instruction, teaching and learning strategies, curriculum, learning support materials as perceived by the teachers, and school plant and facilities as perceived by the teachers are moderately implemented in their respective schools. While on learning support materials and school plant and facilities as perceived by the students stated that the implementation is fairly implemented. There is no significant relationship between the profile of the teachers and students to their perceptions in the implementation of Academic-STEM. Further, there is significant difference between the perceptions of the teachers and students on the implementation of the Academic-STEM in all indicators.**

Keywords: **STEM, implementation, perceptions, Division of Biliran.**

1. INTRODUCTION

In the Philippine context, education remains a top priority. Despite the various development plans and projects formulated by the government and different sectors, the quality of Philippine education still leaves much room for improvement. (Enhanced K to 12 Basic Education Program: opportunities and challenges, Economic Issue of the Day)

Philippine Basic Education (2013) said that the Science, Technology, Engineering and Mathematics (STEM) strand of the Philippine K to 12- Enhanced Basic Education Curriculum is designed to produce graduates of secondary level who will take science, research, and engineering related courses in tertiary level and thereby add to the scientific and scholarly workforce of the country.

Magno (2010) further stated that a curriculum that is purposely designed for Mathematics and Science inclined students could be the answer to a decade-long problem of low number of Mathematics and Science practitioners in the country. It may be attributed to the poor academic performance of students in both in the elementary and secondary level.

Estonato (2014) pointed out that majority of secondary students are in the beginning level of Mathematics proficiency. Moreover, Lee- Chua (2005) cited that Filipino learners have never been noted for excellent numerical ability. Thus, the implementation of the program could be an effective approach to address the problem.

The researchers were prompted to conceptualize and conduct a study on the implementation of Academic-STEM particularly in Division of Biliran, along with the issues, concerns and perceptions of the teachers and students on this implementation.

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Objectives of the Study

This study aimed to assess the implementation of Academic-STEM in the Division of Biliran.

Specifically, it sought to answer the following:

1. Determine the profile of the teachers in terms of:

    1.1 age;

    1.2 sex;

    1.3 civil status;

    1.4 highest educational attainment; and

    1.5 relevant training/seminars attended;

2. Find out the profile of the senior high school students in terms of:

    2.1 age;

    2.2 sex;

    2.3 grade level;

    2.4 parents' educational attainment;

    2.5 parents' occupation; and

    2.6 family monthly income;

3. Determine the respondents' perceptions on the implementation of the Academic-STEM.

    3.1 administration and management;

    3.2 instruction;

    3.3 teaching and learning strategies;

    3.4 curriculum;

    3.5 learning support materials; and

    3.6 school plant and facilities

4. Find out the problems encountered on the implementation of Academic-STEM in the Division of Biliran;

5. Ascertain the significant relationship between the profile of the teachers and their perceptions on the implementation of the Academic-STEM.

6. Ascertain the significant relationship between the profile of the senior high school students and their perceptions on the implementation of the Academic-STEM.

7. Find out the significant difference between the perceptions of the teachers and senior high school students on the implementation of the Academic-STEM.

8. Design a program that will strengthen the advocacy and immersion.

Hypotheses

H_{o1}: There is no significant relationship between the profile of the teachers and their perceptions on the implementation of the Academic-STEM.

H_{o2}: There is no significant relationship between the profile of the senior high school students and their perceptions on the implementation of the Academic-STEM.

H_{o3}: There is no significant difference between the perceptions of the teachers and senior high school students on the implementation of the Academic-STEM.

Framework of the Study

This part presents theoretical and conceptual framework of the study.

Theoretical framework. This study is based on Implementation theory by Maskin (1979) which refers to the component of mechanism design. It provides an analytical framework for situations where resources have to be allocated among agents/users but the information needed to make these allocation decisions is dispersed and privately held, and the agents/users possessing the private information behave strategically and are self-utility maximizes. In any situation where the information needed to make decisions is dispersed, it is necessary to have information exchange among the agents/users possessing the information. Allocation decisions are made after the information exchange process terminates. Implementation theory provides a systematic methodology for designing an information exchange process followed by an allocation rule that leads to allocation decisions that are "optimal" with respect to some pre-specified performance metric

Conceptual framework. This study aimed to assess the implementation of the Academic-STEM in the Division of Biliran.

The parameters of this study covered the profile of the teachers in terms of: age, sex, civil status, highest educational attainment, and relevant training/seminars attended; and the profile of the senior high school students in terms of: age, sex, grade level, parent's educational attainment, parent's occupation and family monthly income. It also determines the respondents' perceptions on the implementation of the Academic-STEM.

The output of this study was a program that strengthened the advocacy on Academic-STEM implementation.
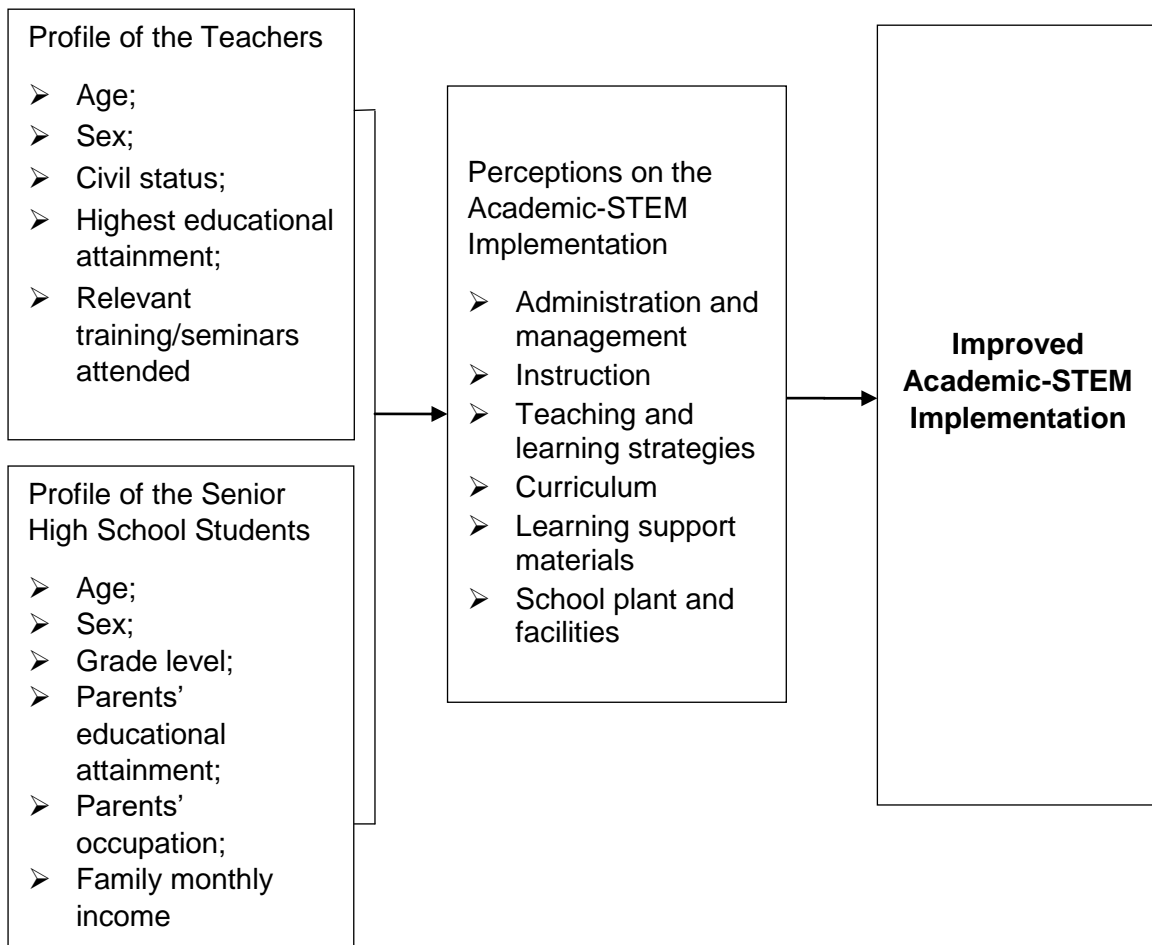
Fig. 1 presents the conceptual framework of the study.

Fig. 1. The Conceptual Framework of the Study

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2. METHODOLOGY

The study utilized the descriptive-correlational method of research. It is descriptive since it is concerned with determining the profile of the respondents and their perceptions on the implementation of the Academic-STEM in Biliran Division. This study was conducted on secondary schools offering senior high schools with Academic-STEM in the Division of Biliran. The respondents of this study involved 30 teachers and 120 students from senior high schools in the Division of Biliran offering Academic-STEM. The survey questionnaire was utilized as the main tool in gathering the data of this study.

The data gathered during the survey was coded, analyzed, and presented in tabular form using descriptive statistics such as: mean, range, relative frequency and percentage. To ascertain the significant relationship between the profile and the perceptions on the implementation of Academic-STEM, Chi-square and Pearson r were utilized. To determine if significant difference exist on the perceptions of the two groups of respondents, paired-samples t-test was employed.

3. RESULTS AND DISCUSSION

Profile of the Teachers

This section presents the profile of the teachers in terms of: age, sex, civil status, educational attainment, and relevant training/seminars. These are presented in Tables 1 to 4.

Table 1: Age, Sex and Civil Status of the Teachers

Age	f	%
60 and above (senior)	1	3.3
46-59 (old age)	4	13.3
31-45 (middle-age)	15	50.0
30 years and below (young)	10	33.3
Total	**30**	**100**
Sex	**f**	**%**
Male	10	33.3
Female	20	66.7
Total	**30**	**100**
Civil Status	**f**	**%**
Single	10	33.3
Married	20	66.7
Total	**30**	**100**

Age. As reflected in Table 1, most of the teachers were 31-45 years old with a frequency of 15 or 50 percent. The age bracket of 30 years old and below had a frequency of 10 or 33.3 percent. Other teachers belonged to the age bracket of 46-59 years old with a frequency of 4 or 13.3 percent, while the least of the teachers belonged to the age bracket of 60 years old and above having a frequency of 1 or 3.3 percent.

As a whole, the respondents were in their middle age period. This finding sustained the reliability of the information gathered from the respondents, considering their age status. Further, the variation in the frequencies of the different age groups is a strong indicator that the different age groups were represented in the sample.

Sex. Majority of the teachers were female with a frequency of 20 or 66.7 percent, while the male teachers were only 10 or 33.3 percent. This finding clearly indicated that there were more female than male teachers. The study of Sankar et al. (2008) shows that male and female teachers differ in terms of their classroom management practices and their belief in students' learning ability. In partial support of the policy of hiring more female teachers, it also shows that being in a female teacher's classroom is advantageous for language learning but teacher gender has no effect on mathematics learning.

Civil status. Married had a frequency of twenty 20 or 66.7 percent, and single had 10 or 33.3 percent. It implies that majority of the respondents are married. A study on Americans by Schoenborn (2004) indicated that married adults are

healthier than unmarried adults. Consequently, Islahi and Nasreen (2013) study revealed that there were negative significant differences in effectiveness between unmarried and married male teachers.

Table 2: Highest Educational Attainment of the Teachers

Highest Educational Qualification	f	%
Doctorate Degree	0	0
Masters Degree with Doctoral Units	3	10.0
Masters Degree	7	23.3
Bachelor's Degree with MA Units	12	40.0
Bachelor's Degree	8	26.7
Total	**30**	**100**

Highest educational attainment. Table 2 shows the highest educational attainment of the teachers in which most of the teachers are Bachelor's Degree with MA units having a frequency of 12 or 40.0 percent. While, Bachelor's Degree had a frequency of 8 or 26.7 percent, Masters Degree had a frequency of 7 or 23.3 percent and only 3 or 10.0 percent are still pursuing Doctorate Degree. The above findings indicate that the respondents are all educationally qualified, but there is still a need for most of them to grow more professionally through finishing at least a master's degree.

Table 3: Relevant Training/Seminars Attended

Indicators	f	Rank
National Training/Seminars	2	3
Regional Training/Seminars	10	1
Local Training/Seminars	4	2

*Multiple Responses

Relevant training/seminars. The national and local training/seminars attended by the teachers had a frequency of 2 or ranked 3. Meanwhile, the regional trainings garnered highest number of training/seminars attended by the teachers with a frequency of 10 as rank 1. This implies that teachers had not enough training/seminars related to STEM.

Profile of the Senior High School Students

This part shows the profile of the senior high school students in terms of: age, sex, and grade level, educational attainment of parents, parents' occupation, and monthly income. These are presented in Tables 4 to 8.

Table 4: Age, Sex and Grade Level of the Students

Age	f	%
19 years old	2	1.7
18 years old	37	30.8
17 years old	55	45.8
16 years old	26	21.7
Total	**120**	**100**
Sex	**f**	**%**
Male	46	38.3
Female	74	61.7
Total	**120**	**100**
Grade Level	**f**	**%**
Grade 11	72	60.0
Grade 12	48	40.0
Total	**120**	**100**

Age. As depicted in Table 4, most of the senior high school students were 17 years old with a frequency of 55 or 45.8 percent. While the least of the students belonged to the age of 19 years old having a frequency of 2 or 1.7 percent. The result indicates that the age group of 17 years old is majority in the variation of frequencies.

Sex. Majority of the students were female with a frequency of 74 or 61.7 percent, while the male students are only 46 or 38.3 percent. It implies that the respondents of the study are female dominated.

Grade level. As shown in the table, grade 11 obtained the highest frequency of 72 or 40 percent while grade 12 is 48 or 40.0 percent. It implies that majority of the respondents.

Table 5: Educational Attainment of Parents

Indicators	Father (f)	%	Mother (f)	%
Post Graduate	2	1.7	3	2.5
College Graduate	31	25.8	27	22.5
College Level	19	15.8	18	15.0
High School Graduate	27	22.5	35	29.2
High School Level	19	15.8	17	14.2
Elementary Graduate	9	7.5	11	9.2
Elementary Level	13	10.8	9	7.5
Total	**120**	**100**	**120**	**100**

Educational attainment of parents. As shown in Table 5, majority of the father's educational attainment is college graduate having a frequency of 31 or 25.8 percent while for mothers' educational attainment is high school graduate with a frequency of 35 or 29.2 percent. However, a frequency of 9 or 7.5 percent obtained for elementary graduate in fathers' educational attainment and the same frequency attained by the mother but on elementary level. This indicates that only few of the respondents' parents did not finish their college degree.

Table 6: Parents' Occupation

Indicators	Father (f)	%	Mother (f)	%
Practicing Professional	19	5.3	18	15.0
Government Employed	6	5.0	8	6.7
Self-Employed	7	5.8	7	5.8
Skilled and semi-skilled laborers	57	47.5	4	3.3
Unskilled laborers/Domestic helpers/Housewives	6	5.0	72	60.0
No Job	25	20.8	11	9.2
Total	**120**	**100**	**120**	**100**

Parents' occupation. As shown in Table 6, the fathers' occupation of being 'skilled and semi-skilled laborers' got the highest frequency of 57 or 47.5 percent. It follows with no job having a frequency of 25 or 20.8 percent which indicates that majority of the fathers' occupations is deemed as not sufficient income considering the nature of their work.

Meanwhile, on mothers' occupation, 'unskilled laborers and housewives' got the highest frequency of 72 or 60.0 percent. This indicates that majority of the mothers are housewives which describes a woman whose work is running or managing her family's home; caring for her children; buying, cooking, and storing food for the family; buying goods that the family needs in everyday life; housekeeping and maintaining the home; and making clothes for the family, and who is not employed outside the home. Further, it implies that though most of them are housewife, yet they contributed a lot in the home.

Memo, et al. (2010) in their research on the impact of socio-economic status on students' educational achievement at secondary schools districts of Malir, Karachi, in Indian. They found that there was a significant relationship between parents' occupation and students' academic performance in matriculation examination. Students whose fathers have better occupation performed well in matriculation examination than those students whose fathers have a less prestigious occupation.

Table 7: Family Monthly Income

Income	f	%
10,000 or more	11	9.2
8,001-10,000	12	10.0
6,001-8,000	17	14.2
4001-6000	13	10.8
4,000 and below	67	55.8
Total	**120**	**100**

Family monthly income. The table above illustrates the variation of frequencies for family monthly income. It clearly indicates that the bracket of 4,000 and below obtained the highest frequency of 67 or 55.8 percent. Meanwhile, 11 or 9.2 percent having an income of 10,000 or more. It implies that majority of the respondents' family income belongs to the lowest bracket.

Perceptions of the Respondents on the Implementation of the Academic-STEM

This part presents the perceptions of the respondents on the implementation of the Academic-STEM in the Division of Biliran. These are presented on the foregoing tables.

Table 8: Respondents' Perceptions on the Implementation of the Academic-STEM in terms of Administration and Management

Indicators	Teachers (WM)	Interpretation
Manage the implementation, monitoring and review of the STEM improvement plan.	4.2	Moderately Implemented
Manage the processes and procedures in monitoring students' achievement.	4.4	Moderately Implemented
Assess the effectiveness of curricular/co-curricular programs and/or instructional strategies.	4.3	Moderately Implemented
Evaluate lesson plans as well as classroom and learning management.	4.7	Fully Implemented
Assign teachers and other personnel to their area of competence.	4.4	Moderately Implemented
Allocate/prioritize funds for improvement and maintenance of school facilities and equipment.	4.3	Moderately Implemented
Provide STEM training/mentoring workshops for teachers.	4.2	Moderately Implemented
AWM	**4.3**	**Moderately Implemented**

As depicted in Table 8, the perceptions on the implementation of the Academic-STEM as perceived by the teachers in terms of administration and management obtained an average weighted mean of 4.3 interpreted as moderately implemented. All of the indicators were found to be on the category of moderately implemented except the indicator

'Evaluate lesson plans as well as classroom and learning management' which obtained a weighted mean of 4.7 described as fully implemented. This means that majority of the school heads really evaluate their teachers if they have these lesson plans as well as organized classroom and learning management.

Further support to the foregoing findings was what Harris (2008) averred, the school heads' awareness of and sensitivity to the contexts in which they employ their own value systems and authenticity as professional educators.

Respondents' perceptions on the implementation of the academic-STEM in terms of instruction. Table 9 presents the assessment of the respondents on the implementation of Academic-STEM in terms of instruction.

Table 9: Respondents' Perceptions on the Implementation of the Academic-STEM in terms of Instruction

Indicators	Teachers (WM)	Interpretation	Students (WM)	Interpretation
Teachers observed time on task to meet the outcomes expected.	4.4	Moderately Implemented	4.1	Moderately Implemented
Varied teaching-learning strategies are employed to address diverse needs of learners.	4.5	Fully Implemented	3.9	Moderately Implemented
Capable to deliver the intended learning competencies.	4.3	Moderately Implemented	4.1	Moderately Implemented
Teachers are equipped with the necessary learning materials, teacher's guide and curriculum guide.	3.7	Moderately Implemented	4.1	Moderately Implemented
Teachers are competent enough in the delivery of the content and able to transfer learning to the individual learner.	4.2	Moderately Implemented	4.0	Moderately Implemented
Teachers teach students basic values and core assumptions of the K-12 Basic Education program that shape the content and methods of academic disciplines.	4.4	Moderately Implemented	4.1	Moderately Implemented
Teachers are evaluated with their existing STEM lessons as he/she consider it in the classroom.	4.3	Moderately Implemented	3.9	Moderately Implemented
AWM	**4.3**	**Moderately Implemented**	**4.0**	**Moderately Implemented**

For teachers' perception in terms of instruction, obtained an average weighted mean of 4.3 described as moderately implemented. The indicator 'Varied teaching-learning strategies are employed to address diverse needs of learners' got the highest weighted mean of 4.5 which means fully implemented. This finding is a clear indication of the respondents' awareness that employing innovative techniques could help them is more competent in teaching and learning.

For the students' perception, an average weighted mean of 4.0 corresponding to moderately implemented interpretation, likewise manifested on all the listed indicators. This means that the students believe their teachers that they are capable to deliver intended learning competencies, equipped with the necessary learning materials, and integrate values that shape the content and methods of academic discipline.

Perceptions on the Implementation of the Academic-STEM in terms of Teaching and Learning Strategies. Table 10 illustrates the respondents' perceptions on the implementation of Academic-STEM in terms of teaching and learning strategies.

Table 10: Respondents' Perceptions on the Implementation of the Academic-STEM in terms of Teaching and Learning Strategies

Indicators	Teachers (WM)	Interpretation	Students (WM)	Interpretation
Utilization of backward design process through acceptable evidence, especially feedback and assessment, to planning instruction has been and is being embraced by others.	4.1	Moderately Implemented	3.8	Moderately Implemented
Employ an active learning approach that consists students who work together to achieve a joint learning goal in temporary, ad hoc groups that last from a few minutes to one class period.	4.2	Moderately Implemented	3.9	Moderately Implemented
Make use of formal cooperative learning groups students are given more complex tasks, and typically stay together longer.	4.3	Moderately Implemented	3.9	Moderately Implemented
Utilization of cooperative base groups which are long-term, heterogeneous cooperative learning groups with stable membership whose primary responsibility is to provide each student with the support, encouragement, and assistance he or she needs to make academic progress.	4.2	Moderately Implemented	3.6	Moderately Implemented
Use of problem-based learning which helps students develop skills and confidence for formulating problems they have never seen before.	4.2	Moderately Implemented	3.9	Moderately Implemented
Provide hands-on, experiential learning, and learning through reflection.	3.9	Moderately Implemented	3.9	Moderately Implemented
Use of technology as a tool for learning and collaboration skills.	4.1	Moderately Implemented	4.2	Moderately Implemented
AWM	**4.2**	**Moderately Implemented**	**3.9**	**Moderately Implemented**

All of the listed indicators for teachers and students fall within the moderately implemented scale, the highest of which is on the item that make use of formal cooperative learning groups students are given more complex tasks, and typically stay together longer., with a weighted mean of 4.3. This finding could have emanated from teachers' effective discussion so that students are willing to participate in the class..

Meanwhile, all the indicators for students obtained within moderately implemented scale, the highest of which is on the item, that of the use of technology as a tool for learning and collaboration skills with a weighted mean of 4.1. It indicates that students need concrete examples through the use of technology for them to digest the lessons laid by the teachers.

They ensure that every lesson prepared by the teachers would be presented logically and sequentially so that it will be understood clearly.

In relation to the foregoing findings and implications, the study of Katigbak (2011) concluded that the use of teaching methods is generally effective in teaching, but its effectiveness depends much on the nature of the learners, the difficulty of the lesson, the availability and adequacy of instructional materials, the teacher's professional qualities and the classroom climate.

Respondents' Perceptions on the Implementation of the Academic-STEM in terms of Curriculum. As indicated in Table 11, it could be seen the respondents' perceptions on the implementation of Academic-STEM in terms of curriculum.

Table 11: Respondents' Perceptions on the Implementation of the Academic-STEM in terms of Curriculum

Indicators	Teachers (WM)	Interpretation
The list of standards categorized by domain/sub-domains, components, and competencies/indicators are appropriate for the students.	4.1	Moderately Implemented
It serves as shopping list of skills expected to be developed that could prepare the students for college, employment and for the middle level skills development.	4.3	Moderately Implemented
Provides experience that meet students' needs and stimulate learning in all developmental areas-physical, social, emotional and intellectual.	4.4	Moderately Implemented
Making the curriculum relevant to learners. (contextualization)	4.4	Moderately Implemented
Ensuring integrated and seamless learning. (spiral progression)	4.4	Moderately Implemented
Provides that each student is viewed as a unique person with an individual pattern and timing of growth and development.	4.5	Fully Implemented
Design to guide the teachers in developing motor, social, and other readiness skills of the students.	4.4	Moderately Implemented
AWM	4.3	**Moderately Implemented**

The table shows the average weighted mean of 4.3 described as moderately implemented. The indicator ''provides that each student is viewed as a unique person with an individual pattern and timing of growth and development' with a weighted mean of 4.5 described as fully implemented. This implies that the curriculum is clearly defined and aligned to the needs of the students in the senior high school curriculum so that they will be competent if they will enroll in college.

Respondents' perceptions on the implementation of the academic-STEM in terms of learning support materials. Table 12 specifies the respondents' perceptions on the implementation of Academic-STEM in terms of learning support materials.

The average weighted mean of 3.8 for teachers and 3.5 for students which described as moderately implemented and fairly implemented respectively. The indicator 'utilization of varied multi-sensory materials for instruction' under teachers' perceptions got the highest weighted mean of 4.0 interpreted as moderately implemented. This finding points out the motivational function of the utilization of varied multi-sensory materials, of which choice and adaptability to the students' capabilities, needs and interests are considered essential.

Meanwhile, for students' perceptions, four indicators got similar description of fairly implemented. The cited findings stress that the students wanted teachers to make wise use of instructional materials to attain the lesson objectives and make learning more meaningful and.

Table 12: Respondents' Perceptions on the Implementation of the Academic-STEM in terms of Learning Support Materials

Indicators	Teachers (WM)	Interpretation	Students (WM)	Interpretation
LCD projector, laptops, televisions, DVD player, etc. are available resource material used by the teacher in teaching.	3.9	Moderately Implemented	3.7	Moderately Implemented
Utilization of varied multi-sensory materials for instruction.	4.0	Moderately Implemented	3.4	Fairly Implemented
Computer-based instruction and assessment in the STEM fields.	3.8	Moderately Implemented	3.2	Fairly Implemented
Adoption of standards-aligned instructional materials.	3.8	Moderately Implemented	3.4	Fairly Implemented
Utilization of graphic organizers, webquests, and simulations to maximize student learning during instruction.	3.9	Moderately Implemented	3.5	Fairly Implemented
Internet search tools were used both to maximize student learning and enhance teacher practice.	3.9	Moderately Implemented	3.7	Moderately Implemented
Utilization of digital still and video cameras to document student learning and spreadsheets to communicate student assessment data.	3.7	Moderately Implemented	3.3	Fairly Implemented
AWM	**3.8**	**Moderately Implemented**	**3.5**	**Fairly Implemented**

Supportive to the foregoing findings and implications were the studies depicting the use of instructional materials in the teaching-learning process for the enhancement of instruction, transfer of learning and students' development of varied competencies.

Valencia (2007) concluded in her study that the students of Canossa Schools in Region IV A revealed a satisfactory performance in Mathematics and this could be accounted to the teachers' effective utilization of both teaching strategies and instructional materials.

The study of Dinglasan (2007) also attributed the use of printed and audio-visual materials, along with different teaching strategies, as the factors for the very satisfactory performance of the students as reflected in their quizzes, recitation, assignment, periodical test and projects.

Respondents' perceptions on the implementation of the academic-STEM in terms of school plant and facilities. Table 13 shows the respondents' perceptions on the implementation of Academic-STEM in terms of school plant and facilities.

Three of the listed indicators for teachers fall within the fairly implemented scale, the lowest of which is on the item that of 'adequate and timely books are provided', with a weighted mean of 3.3. This finding could be a basis for acquiring new and updated books and other reading materials as reference. Thus, aiding the teachers to implement their plans and activities for their students using these timely books.

Table 13: Respondents' Perceptions on the Implementation of the Academic-STEM in terms of School Plant and Facilities

Indicators	Teachers (WM)	Interpretation	Students (WM)	Interpretation
Adequate and timely books are provided.	3.3	Fairly Implemented	3.1	Fairly Implemented
Adequate laboratories for: a.) Math b.) Science c.) ICT with Internet connections	3.4	Fairly Implemented	2.5	Poorly Implemented
Classrooms conducive to learning.	4.5	Fully Implemented	3.7	Moderately Implemented
Presence of functional school library.	3.7	Moderately Implemented	3.0	Fairly Implemented
Concrete structures exist for the provision of auxiliary services: a.) student center b.) health clinic c.) comfort rooms	3.8	Moderately Implemented	3.3	Fairly Implemented
Instructional support materials are readily available for daily instruction.	3.6	Moderately Implemented	3.3	Fairly Implemented
Provision of equipment for non-academic areas and inclusion of amenities for co-curricular activities.	3.5	Fairly Implemented	3.2	Fairly Implemented
AWM	3.7	Moderately Implemented	3.2	Fairly Implemented

Meanwhile, only one indicator for students obtained within moderately implemented scale, 'classrooms conducive to learning', with a weighted mean of 3.7. Meanwhile, the indicator 'adequate laboratories for: a.) Math b.) Science c.) ICT with Internet connections' obtained the lowest weighted mean of 2.5 which means poorly implemented. It indicates that students want to learn and experience each course in the Academic-STEM having complete provision of laboratory on each subject.

Problems Encountered on the Implementation of Academic-STEM

Table 14 shows the problems encountered by the respondents on the implementation of Academic-STEM in the Division of Biliran. These are presented in Tables 14 and 15.

Table 14: Problems Encountered by the Teachers

Indicators	f	Rank
Lack of instructional materials, teaching guides and books	16	1
Too many competencies every quarter	3	3
Lack of facilities/rooms for pre-oral and final defense	3	3
Lack of laboratory equipment	3	3
Need more ICT tools and Internet connection	2	5
Adjustment of the students and teachers	1	8
Some teachers are teaching STEM subjects which are not their field of specialization	1	8
Lack of teachers	1	8
Un-mastered pre-requisite skills	1	8
Lack of seminars and workshops	1	8

As reflected in Table 15 are the findings on the problems encountered on the implementation of the Academic- STEM in the Division of Biliran. The table shows that teachers encountered much problem on 'lack of instructional materials, teaching guides and books' which ranked first. It is also noticed that teachers encountered problems on too many competencies every quarter, lack of facilities/room for pre-oral and final defense in their research work and lack of laboratory equipment particularly science experiment.

Meanwhile, some teachers further stressed out that they need more ICT tools and Internet connection for their research work. It means that using ICT is a very useful tool to enhance the teaching and learning process in schools.

Table 15: Problems Encountered by the Students

Indicators	f	Rank
Lack of books and instructional materials	63	1
Lack of facilities /equipment for laboratory experiments.	47	2
Lack of computers or technology / Internet connection to be used in teaching and research	17	3
Inconsistent class schedule / heavy and hectic schedule	10	4
Lack of knowledge / expertise of teachers	9	5
Lack of classrooms / laboratories for the experiment	8	6
Lack of motivation and interests in Mathematics	7	8
No permanent classroom in STEM	7	8
Pressure in Mathematics and research	7	8
Lack of teachers	6	10
Teaching techniques are not varied	5	12
Most of the subjects doesn't fit or unrelated	5	12
Lots of experiments and requirements	5	12
Strict teachers	4	14
Lack of attention on work immersion	2	15

Pertaining to students' problems encountered, 63 out of 120 students stressed out that 'lack of books and instructional materials' are their major problem. Secondly, 'lack of facilities/equipment for laboratory experiments' as ranked 2 having a frequency of 47. Only 2 students said that they got a problem on 'lack of attention on work immersion' as the last rank.

This findings was supported by Estonato (2016) that different areas in the implementation of the Senior High School-STEM curriculum that encountered problems and their respective difficulty level. It shows that among the six areas namely: curriculum, learners, faculty, facility, instructional materials and instruction, the areas that encountered major problems along its implementation were the Facility and the Instructional Materials which ranked first and second among the six areas of the implementation respectively.

Proposed Program to Strengthen the Advocacy and Immersion

The STEM Immersion program was created as a tool to help educators establish and implement for 21st century schools and classrooms. It is written as an over-arching framework to help chart a course for integrating STEM education in all secondary schools that offers Academic-STEM. The STEM Immersion program contains key design elements that support project-based, interdisciplinary STEM instruction by providing practical tools and information to enable teachers, schools and districts, and administrators that want to improve student outcomes by integrating STEM.

Relationship of Variables

This part presents the significant relationship between the profile of the teachers and students to their perceptions in the implementation of Academic-STEM and the significant difference between the perceptions of teachers and students on the implementation of Academic-STEM. These are presented in the foregoing tables.

Profile of the teachers and perceptions on the implementation of Academic-STEM. Table 16 discloses the significant relationship between the profile of the teachers and their perceptions on the Academic-STEM implementation.

Table 16: Significant Relationship between the Profile of the Teachers and their Perceptions on the Implementation of Academic-STEM

Variable	X^2	Df	p-value	Decision
Sex	17.438	10	.065	Ho Accepted
Civil Status	10.500	10	.398	Ho Accepted
Educational Attainment	37.299	30	.169	Ho Accepted
Variable	**r-value**	**Sig.(2-tailed)**		**Decision**
Age	-.146	.688		Ho Accepted
Trainings	-.161	.656		Ho Accepted

All the teacher profile variables on sex, civil status, highest educational attainment, age, and trainings garnered chi-square and r-values greater than the actual values with corresponding df at alpha=0.05.The hypothesis that there is no significant relationship between the profile of the teachers and their perceptions on the Academic-STEM implementation were accepted and therefore not significant. Implication can be drawn that the profile of the teachers is not directly related or affected by their perceptions in Academic-STEM implementation. .

Profile of the students and their perceptions on the implementation of Academic-STEM. Table 17 shows the significant relationship between the profile of the students and their perceptions on the Academic-STEM implementation.

Table 17: Significant Relationship between the Profile of the Students and their Perceptions on the Implementation of Academic-STEM

Variable	X^2	Df	p-value	Decision
Sex	28.093	14	.014	Rejected
Grade Level	9.080	14	.826	Accepted
Fathers' educational attainment	80.038	84	.602	Accepted
Mothers' educational attainment	76.395	84	.602	Accepted
Fathers' occupation	566.818	434	.000	Rejected
Mothers' Occupation	365.938	265	.000	Rejected
Variable	**r-value**	**Sig.(2-tailed)**		**Decision**
Age	.047	.610		Accepted
Monthly Income	.207*	.023		Rejected

*Correlation is significant at the .05 level (2-tailed)

Some of the students' profile variables on grade level, parents' educational attainment and age acquired chi-square and r-values greater than the actual values with corresponding df at alpha=0.05. Therefore, the hypotheses are accepted which means there is no significant relationship.

Meanwhile, the variables sex, parents' occupation and family monthly income obtained chi-square and r-values less than .01 level of significance. This means that the hypotheses are rejected and therefore there is significant relationship among the variables. It implies that sex, parents' occupation and family monthly income are directly related or affected by their perceptions in Academic-STEM implementation.

Perceptions of the teachers and students on the implementation of the Academic-STEM. Table 18 above shows the significant difference between the perceptions of the teachers and students on the implementation of the Academic-STEM.

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Table 18: Significant Difference between the Perceptions of the Teachers and Students on the Implementation of the Academic-STEM

Variables	Composite Mean		t	P-value	Decision
	Teachers	Students			
Instruction	4.3	4.0	-3.251	.003	Rejected
Teaching and Strategies	4.2	3.9	-4.711	.000	Rejected
Learning Support Materials	3.8	3.5	-4.620	.000	Rejected
School Plant and Faciities	3.7	3.2	-2.482	.019	Rejected

*significant @ .01 level (2-tailed)

All of the indicators have significant difference as sustained by p-values lower than .01 significant. Further, the hypotheses are rejected and therefore there is significant difference between the perceptions of teachers and students on the Academic-STEM implementation. These finding confirms of their considerable extent of implementation on the Academic-STEM.

4. CONCLUSION

From the summarized findings, the following conclusion was drawn:

The schools offering Academic-STEM all throughout Division of Biliran confirmed that the implementation of Academic-STEM in terms of administration and management, instruction, teaching and learning strategies, curriculum, learning support materials as perceived by the teachers, and school plant and facilities as perceived by the teachers are moderately implemented in their respective schools. While on learning support materials and school plant and facilities as perceived by the students stated that the implementation is fairly implemented.

5. RECOMMENDATIONS

From the drawn conclusion, the following recommendations are hereby directed and forwarded:

1. The teacher-respondents who have not yet finished their master's degree should consider the option of pursuing it, not merely for promotion but more so for their professional growth and development.

2. The schools should maintain and even bring to a higher level their implementation of Academic-STEM through adopting more innovative trends, improving their facilities and preparing themselves for globalization.

3. The teachers should also maintain and strengthen further their implementation of Academic-STEM through attending more in-service training and seminars related to STEM. They should also be more resourceful and creative by keeping themselves abreast of the current educational trends.

4. Teachers and school heads should find enough time conferring with parents by institutionalizing a program where a regular orientation, and consultation not only with the students but also with other stakeholders, particularly the parents.

5. Teacher-respondents should use research-based instructional practices and, in particular, the importance of inquiry-based curricula connected to careers and postsecondary opportunities in implementing STEM education.

6. The schools should need to be equipped with the appropriate equipment to support student learning and to ensure success in implementing STEM.

7. School administrators should motivate and encourage the teachers of STEM to update and adopt new trends of teaching.

8. Similar study should be undertaken utilizing the same instruments and methodologies but in different setting and bigger sample

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