

# **RESEARCH NEEDS OF STEM STUDENTS: BASIS FOR A CONTEXTUALIZED STRATEGIC INTERVENTION MATERIAL IN PRACTICAL RESEARCH**



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## **ABSTRACT**

The Department of Education established the K–12 Basic Education in response to needs, problems, and technological advancements on a global scale. This educational reform resulted in a two-year extension of the basic education program. Senior High School, a second two-year institution, was created to assist students in preparing for college, entrepreneurship, and work. One of the strands in the Senior High School - Academic Track, Science, Technology, Engineering and Mathematics or STEM, was purposefully developed to help students get the education they need to work as experts and influencers in the fields of engineering, medicine, and technology. Due to these reasons, STEM students need to be exposed to careers that make use of their aptitudes for problem-solving, critical thinking, and the development and use of new technologies. Research has a major role in the development of these abilities. Research is used to understand how and why integrated STEM activities can promote learning and intellectual development. STEM study establishes links between concepts and visual representations. The purpose of this study is to evaluate the research needs of STEM students. Its goal is to investigate the issues that should be highlighted and dealt with in relation to teaching research subjects as a contextualized subject in the strand. The findings of this study will serve as the foundation for the creation of contextualized strategic intervention materials for use in practical research in the future. The study used a descriptive research methodology. In the study, a requirements assessment methodology was applied explicitly. The study assessed and identified the needs for research among STEM students. This occurred in the second semester of the academic year 2021–2022. The study's participants were the STEM 11 students enrolled in Binan Integrated National High School. A validated survey questionnaire that was administered to them online utilizing the appropriate platform was made available to the participants. After receiving approval to conduct the study, data gathering, and analysis officially began. The findings highlight the students' demands in terms of research in the fields of science, technology, engineering, and mathematics. The findings showed that

STEM students are highly interested in a wide range of research areas. They are more accustomed to conducting qualitative research, which is followed by experimental research, which is more pertinent to the fields of science and technology because these fields depend on experimentation to obtain data and draw valid findings. The conventional research format, which consists of a full study with five chapters, including an introduction, a review of related literature, a methodology, a presentation, an analysis and interpretation of the data, as well as a summary, a conclusion, and recommendations, is also more accustomed by students. Most respondents claimed that using the teacher's guided instruction and direct instruction tactics helped them understand more about STEM research.

*Keywords: needs assessment, contextualization, research, science*

## **INTRODUCTION**

Changes in educational procedures have taken place as a result of advances in science and technology. To train the workforce needed to boost the country's economy, new educational institutions that allow for the training of people with high problem-solving abilities, the capacity for critical thought, and the capacity for collaboration are required. The K to 12 Basic Education was put into place by the Department of Education in response to these difficulties. The basic education program was extended by two years because of this educational reform. The additional two-year school, known as Senior High School, was designed to help students get ready for college, entrepreneurship, and the employment. Different paths were created to address the requirements of society, the interests of the students, and the problems of globalization.

The Academic Track is divided into four distinct strands, including the General Academic Strand, Accountancy, Business and Management (ABM), Humanities and Social Sciences (HUMSS), and Science, Technology, Engineering and Mathematics (STEM) (GAS). STEM has been thoughtfully created to assist students in obtaining the education they need to work as experts and influencers in the fields of engineering, medicine, and

technology. Due to these factors, STEM students need to be introduced to fields that make use of their aptitudes for problem solving, critical thinking, and the creation and use of new technology. The development of these skills depends heavily on research. Understanding how and why integrated STEM activities can help growth in learning and thinking is based on research. STEM research makes connections between ideas and visual representations.

Students must not only comprehend research but also immerse themselves in it because it is a crucial component of STEM education. Through research, students can advance their reading and writing abilities as well as their critical and analytic, data analysis, research, presenting, creative, cultural, and civic skills.

Research in STEM education is essential to producing future STEM employees who are well-rounded, remarkable, and competent. The present Senior High School curriculum includes Practical Research 1 and 2, Inquiries, Investigation, Immersion (3is), and Capstone Project. Subjects that are contextualized have the same topic but different competencies. These disciplines must be taught across all strands with the same competencies but different content. STEM students' research needs must be adequately identified and assessed to

deliver high-quality, relevant materials that will assist them in comprehending and linking ideas and representations in their chosen strand.

### METHODOLOGY

The study used a descriptive methodology. Specifically, the study employed needs assessment procedure. The systematic process of identifying and addressing needs, or "gaps" between the present state and the intended state or wants, is known as needs assessment.

The participants of the study are 56 STEM 11 students enrolled in Binan Integrated National High School. The participants were purposely selected based on their track and strand in Senior High School. The participants are selected based on the ability to answer an online survey questionnaire since these students are in the blended learning modality.

As a tool for gathering data, a survey questionnaire, more specifically a needs assessment survey, was employed. Experts in the field of content for STEM instruction and research validated the instrument.

The data gathered from the accomplished survey questionnaire by the participants were then collected, analyzed and interpreted.

### RESULTS

The study aimed to assess the research needs of the STEM students as basis for a strategic intervention material in Practical Research.

Mean and standard deviation is used to analyze the data. The needs assessment survey yielded the following specific results:

Table 1 shows the field of research interest of the respondents. Out of the 20

research fields, 165 responses were received. Animal Sciences was the research area that respondents chose the most, accounting for 36.8% of respondents and 12.7% of all responses. Earth and environmental sciences, which accounted for 26.3% of respondents and 9.1% of all responses, respectively, are the second- and third-most preferred fields of study. Robotics and Intelligent Machines, which accounted for 7.9% of all responses and 22.8% of respondents, is the third most popular research area.

**Table 1. Field of Research Interest**

Field of Research	Responses		
	N	Percent	Percent of Cases
Animal Sciences	21	12.7%	36.8%
Biochemistry	9	5.5%	15.8%
Biomedical and Health Choices	15	9.1%	26.3%
Biomedical Engineering	7	4.2%	12.3%
Cellular and Molecular Biology	4	2.4%	7.0%
Chemistry	7	4.2%	12.3%
Computational Biology and Bioinformatics	1	0.6%	1.8%
Earth and Environmental Sciences	15	9.1%	26.3%
Embedded Systems	1	0.6%	1.8%
Energy: Sustainable Materials and Designs	6	3.6%	10.5%
Engineering Mechanics	9	5.5%	15.8%
Environmental Engineering	4	2.4%	7.0%
Material Science	2	1.2%	3.5%
Mathematics	9	5.5%	15.8%
Microbiology	5	3.0%	8.8%
Physics and Astronomy	12	7.3%	21.1%
Plant Sciences	11	6.7%	19.3%
Robotics and Intelligent Machines	13	7.9%	22.8%
Systems Software	12	7.3%	21.1%
Translational Medicine	2	1.2%	3.5%
Total	165	100.0%	289.5%

Table 2 shows the type of research interest of the students. Out of the 3 categories of research interest, there were a total of 57 replies. Most respondents (54.4%) indicated that they were most interested in qualitative research. With 33.3% of the total responders, experimental research is the second most popular area of interest. Descriptive research was the least desired study interest, with only 12.3% of respondents.

## DISCUSSION

**Table 2. Type of Research Interest**

Type of Research	Frequency	Percent
Experimental Quantitative Research	19	33.3%
Descriptive Quantitative Research	7	12.3%
Qualitative Research	31	54.4%
Total	57	100.0

As seen in Table 3, out of the 2 research forms the students are familiar with, there were a total of 57 responses. Given that it was selected by 75.4% of respondents, the traditional format is the one that students are most accustomed to.

**Table 3. Research Format Students are Most Familiar With**

Research Format	Frequency	Percent
Traditional	43	75.4%
IMRAD	14	24.6%
Total	57	100.0

Out of the 5 recommended teaching strategies, there were a total of 104 replies. Guided Instruction, which accounted for 31.7% of all responses and 57.9% of respondents, was the most chosen teaching strategy among the available options. Direct Instruction, which received 30.8% of all replies and was chosen by 56.1% of respondents, is the second most popular teaching method. Cooperative learning, which accounted for 22.1% of all responses and 40.4% of respondents, is the third most favored teaching strategy.

**Table 4. Preferred Teaching Strategy for Research**

Preferred Teaching Strategy	Responses		
	N	Percent	Percent of Cases
Cooperative Learning	23	22.1%	40.4%
Direct Instruction	32	30.8%	56.1%
Flipped Instruction	4	3.8%	7.0%
Guided Instruction	33	31.7%	57.9%
Inquiry – based Learning	12	11.5%	21.1%
Total	104	100.0%	182.5%

The study highlights the students' demands in terms of research in the fields of science, technology, engineering, and mathematics. The findings showed that STEM students are highly interested in a wide range of research areas. They are more accustomed to conducting qualitative research, which is accompanied by experimental research, which is more pertinent to the fields of science and technology because these fields depend on experimentation to obtain data and draw valid findings. The conventional research format, which consists of a full study with five chapters, including an introduction, a review of related literature, a methodology, a presentation, an analysis and interpretation of the data, as well as a summary, a conclusion, and recommendations, is also more accustomed by students. Respondents stated that they gain greater knowledge from the teacher's use of Guided Instruction and Direct instruction strategies.

The results of the needs assessment survey can be used to further enhance and ease the research skills of the students in the Science, Technology, Engineering, and Mathematics strand. The results can also be utilized to review and reinforce the various teaching tactics in research and research-related subjects. They can be used to create contextualized and localized strategic intervention materials. In this situation, STEM students will be able to develop more effective and pertinent research projects, allowing them to immerse themselves in STEM even in their tertiary education courses.

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