Self-Pacing Research (SPaRe) Kit: A Modular Tool in Increasing the Students' Level of Academic Motivation and Research Skills in Practical Research 2

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Received: 19/07/2021, Revised: 05/12/2021, Accepted: 06/12/2021

Abstract

This study aimed to develop a self-pacing research kit and evaluate its effect in increasing the level of academic motivation and research skills of the Grade 12 students despite COVID-19 crisis. The study utilized Mixed Method – Sequential Research Design. The teacher-researcher selected participants from Grade 12 students who were taking-up Practical Research 2 for the First Semester of the School Year 2020 – 2021. The population of the study were from, Santa Ignacia South District, Division of Tarlac Province, Philippines. As a result, it has been found that grade 12 students' level of academic motivation before the use of the SPaRe Kit is "fairly motivated". After the use of the SPaRe Kit, students' motivation shifted to "highly motivated" at the end of the semester. Somehow, it has been found that before the use of the SPaRe Kit, Grade 12 students were found to be weak in critical thinking, ability to work with numbers, writing the hypothesis, writing the review of related literatures, deciding and writing on proper research designs, deciding and writing proper sampling technique, deciding, writing and carrying out statistical techniques, and analyzing data. Findings also reveal that there is a significant difference in the level of academic motivation and research skills of the Grade 12 students before and after the use of the SPaRe Kit. Thus, it is concluded that the SPaRe Kit contributed positively in increasing the academic motivation and research skills of the students during COVID-19 pandemic crisis.
Keywords: research skill, academic motivation, Practical Research 2.

1. Background of the Study

It has been a stereotype for research classes to be boring or terrifying, or both. This, coupled with low mastery in mathematical or statistical analysis, low level of motivation, and limited skills in applying the research processes, hinders student's drive to finish a research output while enjoying the research class (Bartolic, 2016).

To date, a few approaches, methodologies and innovations have been emerging to make research classes student-centered and child-friendly. Teachers sometimes

employ deductive teaching, problem-based learning or inquiry-based learning which are typically common strategies in a research class. However, lecture-based and other conventional methods of teaching research are still widely used by many research teachers because of the unavailability of materials for research and failure to innovate new techniques.

Conventionally, students in Practical Research Class study the lessons through lectures, and then, clustered into groups, to share thoughts and collaborate to end-up with a research output before being able to present or disseminate results. This methodology often leads to a very low participation among the students and low level of motivation to cooperate with the group as observed by the teacher-researcher in his previous research class. Many independent students who lead the groups often share sentiments about their classmates not even contributing to their research output.

Aside from this problem, a poor performance in quantitative researching also rooted from a low mastery level of the competencies in its prerequisite subject – Statistics and Probability. Statistics is the language of the Quantitative Research. In the data obtained from the students in the subject Statistics and Probability for the school year 2019 – 2020, the Mean Percentage Score (MPS) for the third quarter and fourth quarter are 67.09 and 71.87 respectively. Although, there was an increase in the MPS from third quarter to fourth quarter, it is not an assurance that students will be performing better in its requisite subject – Practical Research 2.

Padapada National High School, the school where the teacher-researcher teaches, is an institution that aims to adhere with the mandates of the Department of Education by making alternative deliverables and producing research-oriented students in these trying times of COVID-19. Thus, the teacher researcher considered to utilize the research kit to other schools, which are the Calipayan National High School and Sta. Ines National High School, located within the district of Santa Ignacia South for a larger scale of utilization of the researcher-developed modular tool. It is in this perspective that the study is conceptualized. This is to increase the level of academic motivation and research skills of the students during in quantitative researching during the implementation of distance learning modalities.

2. Research Questions

This study aimed to develop a self-pacing research kit and to evaluate its effect in increasing the level of academic motivation and research skills of the Grade 12 students of Padapada National High School in Practical Research 2 (Quantitative Research) for the first semester of school year 2020 – 2021 in spite of COVID-19 crisis.

Specifically, the study sought to answer the following questions:

1. How do the Grade 12 students' assess the Self-Pacing Research (SPaRe) Kit as a modular tool for distance learning in terms of:

1.1. Quality of Content;
1.2. Language and Mechanics;
1.3. Usability; and
1.4. Potential Effectiveness as a Learning Tool?

2. How are the Grade 12 students be described before and after the use of the intervention in terms of:

2.1. Level of Academic Motivation
2.2. Research Skills

3. Is there a significant difference between the level of academic motivation of the Grade 12 students before and after the use of the intervention?

4. Is there a significant difference between the level of research skills of the Grade 12 students before and after the use of the intervention?

5. What strategic instructional plan can be proposed to increase the academic motivation and research skills of the students?

3. Hypotheses

In this study, the teacher-researcher tested the following null hypotheses at 0.01 alpha level:

a. There is no significant difference in the level of academic motivation of the Grade 12 students before and after the use of the intervention.
b. There is no significant difference in the level of research skills of the Grade 12 students before and after the use of the intervention.

4. Theoretical and Related Literature

Back in 2016, when senior high school was first implemented in the Philippines, Grade 10 Completers were required to go to Grade 11 and Grade 12 (Senior High School) where they will take series of research classes including the Practical Research 2. Practical Research 2 (Quantitative Research) is one of the applied subjects meaning it is required for all the tracks and strands but must be taught in the context of the track. It is directly concerned in investigating and observing a phenomenon through numerical and computational analysis or techniques (DepEd Order no. 51, 2015).

Also, since a possible delay in school opening from June to August or later months may arise, Department of Education is preparing the implementation of multimodal approaches to learning such as online learning or modular approach. According to DepEd Undersecretary Sevilla (2020), face-to-face classroom instruction may still not be possible if school remain closed due to the continued threat of Corona Virus Disease (COVID)-19 (Manila Bulletin, 2020).

Modular approach has been found as an effective strategy in teaching. Modules enable the learners to have a control over their pace of learning that leads to develop

creative challenges that lead to improvement in mathematics. In modular approach, all the capabilities required to perform are closely inter-related (Charles, 2020).

The teacher-researcher developed a Self-Pacing Research (SPaRe) Kit. The research kit is a module designed for senior high school students of Santa Ignacia South District, that follows the Most Essential Learning Competencies (MELC) set by the Department of Education for Practical Research 2 to address their needs in increasing their level of academic motivation and research skills in quantitative researching even without face-to-face interaction with their teacher. The contents and activities included follows the context and applications for all the strands for future use of the material.

A self-learning method is a method of learning that is tailored to the individual. Face-to-face instruction is becoming obsolete, while distance education is gaining popularity. Self-learning modules are created with the learner in mind, allowing them to choose what they want to learn, how they want to learn it, when they want to learn it, and where they want to learn it. This adaptability is a crucial feature of the open learning process. Other techniques of instruction are gradually fading as a result of the introduction of information technology for communication. The student is becoming more acclimated to non-formal education, resulting in a preference for self-learning approaches. Even the majority of printed resources on the market are designed for self-study. The learner has an advantage when employing self-paced learning resources in this non-formal mode of education. There is no face-to-face interaction during the teaching-learning-evaluation process (Sequiera, 2012).

The Self-Pacing Research (SPaRe) Kit was a simplified learning material kit on how to write a quantitative research. It provides an outline of the parts and processes of a quantitative research. Cognitive, affective and psychomotor facets were the basis of activities set in the material to address the need of students in research. Simply put, the research becomes an outline or guide where the student researchers merely furnish what is necessarily required to accomplish along the completion of their quantitative study.

5. Methodology

5.1 Research Design

The study utilized Mixed Method – Sequential Research Design (Quantitative – Qualitative). This method focused on first collecting quantitative data and then collecting qualitative data to help explain or elaborate on the quantitative results (Creswell, 2012).

5.2 Participants

The teacher-researcher selected participants from Grade 12 students who were taking-up Practical Research 2 for the First Semester of the School Year 2020 – 2021. The population of the study were the Grade 12 students from, Santa Ignacia South District, Division of Tarlac Province. It is in this reason why the samples were selected from the schools of the Santa Ignacia South District that offer senior high school curriculum.

Table1: Participants of the Study

School	Population	Sample	Total Sample
Padapada National High School	249	139	139
Sta. Ines National High School	20	11	11
Calipayan National High School	35	20	20
Total	304	170	170

5.3 Instrument/s

The instruments used in this study were likert scales, self-assessment questionnaire and a semi-structured interview guide.

A module evaluation tool was adopted from the study of Goode (2003) and was marginally modified based on the context of student's view for assessment of the tool. The tool consisted of three major sections which aimed to assess the following: (1) Quality of Content; (2) Usability; and (3) Potential Effectiveness as Learning Tool.

Another five-point likert scale was a teacher-made scale composed of 30 items that was used to gather the data in identifying the level of academic motivation of the students before and after the use of the Self-Pacing Research (SPaRe) Kit.

A self-assessment questionnaire in Practical Research 2 was used and administered to the participants of the study to identify their level of research skills in quantitative researching before and after the use of the intervention material. It is composed of 20 items to clearly assess the research skills of the students. The instrument was primarily adopted and redesigned based on the tool developed by Rivera (2019) on Research Skills Assessment (RSA).

Lastly, a semi-structured interview questionnaire was constructed to identify the students' view or perception on the effects of using the Self-Pacing Research (SPaRe) Kit. It was composed of five (5) open-ended questions wherein answers from the participants were recorded through the google meet with proper consent and ethical considerations imposed during the interview.

5.4 Data Collection Procedure

The teacher-researcher sought permission from the Education Program Supervisor-Science/Research, Education Program Supervisor - LRMDS, and Public Schools District Supervisor for the utilization and adoption of the module during the First Semester of the School Year 2020 – 2021 in the District of Santa Ignacia South. Also, the teacher-researcher asked permission from the Head Teacher of the senior high school department and the school principals of schools in Santa Ignacia South District used in this study to conduct the experimentation, utilization of the intervention material, and data gathering.

After the questionnaires were developed, their validity and reliability were computed. Comments and suggestions from experts were also incorporated. When found valid and reliable, it was reproduced and administered to the participants of the study.

For the difficulty index, discrimination index, and reliability of the test, a dry run will be conducted. The dry run testing involved 30 students randomly selected from the Grade 12 who were not included in the final conduct of the study. For the computation of reliability, the cronbach's alpha was used using the SPSS.

After the data gathering through the questionnaires, the teacher-researcher collected the materials and conducted a focus group interview with 10 randomly selected students from the participants on a separate schedule to identify their perceived effects of the intervention material to them. The interview took for approximately 20 – 30 minutes for the whole interview session.

5.5 Ethical Considerations

The study obtained an informed consent from the participants before being subjected to the conduct of the study. Since some of the Grade 12 students were minors (below 18 years of age), parents or guardians were made aware of the said activity through a communication letter and parental permit that were sent through the envelopes of the students for their modules. Participants were oriented thoroughly about the conduct of the study through a letter and video conferencing. The purpose and procedures during the course of the study was discussed in detail to the students. After explaining, the students were given opportunity to ask questions for further clarifications and so the teacher-researcher was able to answer it correctly and honestly before the consent took part. When the students agreed to sign, a copy of the informed consent and cover letter assuring the privacy, anonymity and confidentiality were given to them as a sign of agreement.

The teacher-researcher observed the principles of voluntary participation in this study. The students who decided not to participate in the study were not deducted to their actual performance in the subject. Also, the right to individual autonomy was given to the students that even when they signed a consent form, they were free to

withdraw from the study at any time even without giving reasons. Likewise, the teacher-researcher cited the original author about the use of the instrument which the teacher-researcher patterned the likert scales developed and research skills assessment adopted in this study to measure students' level of motivation and research skills.

6 Results of the Study

1.Students' Assessment of the Self-Pacing Research (SPaRe) Kit as a Modular Tool in Practical Research 2

Table 2: Summary of the Means of the Assessment of the Grade 12 Students on the Use of SPaRe Kit

Variables	Grand Mean	Standard Deviation	Interpretation
Quality of Content	4.021	0.653	Agree
Language and Mechanics	4.529	0.520	Strongly Agree
Usability	4.254	0.871	Strongly Agree
Potential Effectiveness as a Learning Tool	4.445	0.510	Strongly Agree

The Grade 12 students have a high and positive assessment on the Language and Mechanics (mean = 4.529, SD = 0.520), Usability (mean = 4.254, SD = 0.871), and Potential Effectiveness (mean = 4.445, SD = 0.510) of the SPaRe Kit as their learning tool in Practical Research 2 class.

2. Grade 12 Students' Level of Academic Motivation and Research Skills

In this study, the Grade 12 students' level of academic motivation and research skills were assessed in order to draw inferences about how effective the SPaRe kit was as a learning tool for Practical Research 2 class during distance learning.

2.1. Level of Academic Motivation

Table 3: Frequency Distribution of the Grade 12 Students in Terms of Level of Academic Motivation

Level of Academic Motivation	Before the Use of SPaRe Kit		After the Use of SPaRe Kit	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Extremely Motivated	24	14.12%	46	27.06%
Highly Motivated	43	25.29%	90	52.94%
Fairly Motivated	76	44.71%	31	18.24%
Poorly Motivated	22	12.94%	3	1.76%
Not Motivated	5	2.94%	0	0%
Total	**170**	**100%**	**170**	**100%**
Mean	3.347	Fairly Motivated	4.053	Highly Motivated

Grade 12 students' level of academic motivation before the use of the SPaRe Kit is "fairly motivated" (mean = 3.347). After the use of the SPaRe Kit, students' motivation shifted to "highly motivated" (mean = 4.053) at the end of the semester.

The result and the concept on the level of academic motivation is supported by the study of Inocian, et.al. (2019). Senior High School pupils confront a variety of challenges as a result of a lack of school supplies. They must have a strong sense of motivation in order to complete their studies. The study demonstrates that pupils must be motivated in order to be successful. Furthermore, the results reveal that motivation is unrelated to the student's profile. Gender, grade level, and family history are all factors to consider. It can be deduced that there is no major link between motivation and success.

2.2. Level of Research Skills

Table 4 below shows the frequency distribution of the Grade 12 Students with respect to the five levels of research skills which was adopted from the Research Skills Assessment (RSA) of Rivera (2019).

Table 4: Frequency Distribution of the Grade 12 Students in Terms of Level of Research Skills

Level of Research Skill	Before the Use of SPaRe Kit		After the Use of SPaRe Kit	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Expert Ability	6	3.53%	27	15.88%
Strong Ability	20	11.76%	75	44.12%
Moderate Ability	67	39.41%	63	37.06%
Weak Ability	64	37.65%	5	2.94%
No Ability	13	7.65%	0	0%
Total	**170**	**100%**	**170**	**100%**
Mean	2.824	Moderate Ability	4.161	Strong Ability

Grade 12 students' level of research skills before the use of the SPaRe Kit falls under "moderate ability" level (mean = 2.824). When the use of the SPaRe Kit was done, students' level of research skills shifted to "strong ability" level (mean = 4.161).

In the study of Estacio, et.al. (2018), it has been found out that the Grade 12 students' research capabilities were only at the average level. Male and female students were comparable in the ability to conduct research. Opportunities for quantitative instruction were lacking in the context of the participants.

Table 5: Mean Responses of the Grade 12 Students as to their Self-Assessed Research Skills in Practical Research 2

Research Skills	Before the Use of SPaRe Kit		After the Use of SPaRe Kit	
	Mean	**Interpretation**	**Mean**	**Interpretation**
Basic Skills				
1. Critical Thinking	2.367	Weak Ability	3.807	Strong Ability
2. Gathering Information	3.451	Strong Ability	4.639	Expert Ability
3. Organizing Ideas	3.082	Moderate Ability	4.024	Strong Ability
4. Reading Skills	3.094	Moderate Ability	4.582	Expert Ability
5. Ability to work with numbers and graphs	2.069	Weak Ability	4.069	Strong Ability
6. Oral communication skills	3.210	Moderate Ability	4.862	Expert Ability
7. Ability to ask questions and probe to elicit needed information	2.907	Moderate Ability	4.187	Strong Ability
8. Time management	3.091	Moderate Ability	4.571	Expert Ability
9. Ability to collaborate with others	3.980	Strong Ability	4.693	Expert Ability
Sub-Mean	**3.028**	**Moderate Ability**	**4.382**	**Expert Ability**
Technical Skills				
a. Deciding on a topic	3.407	Moderate Ability	4.683	Expert Ability
b. Writing the introduction	2.879	Moderate Ability	4.193	Strong Ability
c. Writing the research questions	2.860	Moderate Ability	4.196	Strong Ability
d. Writing the hypothesis/es	2.467	Weak Ability	4.309	Expert Ability
e. Writing the review of related literature	2.409	Weak Ability	3.976	Strong Ability
f. Deciding on the proper research design and writing about it	2.067	Weak Ability	3.905	Strong Ability
g. Deciding on the proper sampling technique and writing about it	2.567	Weak Ability	4.017	Strong Ability
h. Deciding on the proper statistical techniques and writing about it	2.318	Weak Ability	3.508	Strong Ability

i.	Carrying-out proper statistical techniques	2.395	Weak Ability	3.382	Moderate Ability
j.	Analyzing data	2.560	Weak Ability	3.019	Moderate Ability
k.	Writing the result, conclusions, and recommendations	2.894	Moderate Ability	4.150	Strong Ability
Sub-Mean		**2.620**	**Moderate Ability**	**3.940**	**Strong Ability**
GRAND MEAN		**2.824**	**Moderate Ability**	**4.161**	**Strong Ability**

Before the use of the SPaRe Kit, Grade 12 students were found to be weak in critical thinking, ability to work with numbers, writing the hypothesis, writing the review of related literatures, deciding and writing on proper research designs, deciding and writing proper sampling technique, deciding, writing and carrying out statistical techniques, and analyzing data. The overall research skills of the Grade 12 students increased from "moderate ability" (mean = 3.028) to "expert ability" (mean = 4.328). On technical research skills, it has been found that the SPaRe Kit made an effect on students since their research skills shifted from "moderate ability" (mean = 2.620) to "strong ability" (mean = 3.940).

3. Difference in the Level of Academic Motivation of the Grade 12 Students Before and After the Use of SPaRe Kit

Table 6: T-Test Results on Level of Academic Motivation Before and After the Use of SPaRe Kit

Test	t-value	p-value	Level of Significance	Degrees of Freedom	Decision	Interpretation
t-test	-9.727	0.000	0.01	169	Reject null hypothesis	Difference is significant at 0.01

The study found out that there is a significant difference in the level of academic motivation of the Grade 12 students before and after the use of the SPaRe Kit at 0.01 level of significance (sig = 0.000). This meant that the SPaRe Kit contributes

positively in increasing the level of academic motivation of the students in Practical Research 2 during the pandemic.

4. Difference in the Research Skills of Grade 12 Students Before and After the Use of SPaRe Kit

Table 7: T-Test Results on Level of Academic Motivation Before and After the Use of SPaRe Kit

Test	t-value	p-value	Level of Significance	Degrees of Freedom	Decision	Interpretation
t-test	-13.336	0.000	0.01	169	Reject null hypothesis	Difference is significant at 0.01

It has also been found in this study that there is a significant difference in the level of research skills of the Grade 12 students before and after the use of the SPaRe Kit at 0.01 level of significance (sig = 0.000). Thus, it is concluded that the SPaRe Kit contributes positively in increasing their research skills of the students even during the implementation of distance learning.

5. Proposed Strategic Instructional Plan to Increase the Academic Motivation and Research Skills of the Students

Table 8 below shows a clear proposal of a strategic instructional plan for adoption and implementation of all quantitative research teachers for the improvement of learning outcomes and achievement among the students.

Table 8: Proposed Strategic Instructional Plan

Objectives	Strategies	Person Involved	Time Frame	Success Indicator
To improve the level of academic motivation of the students in dealing with their Practical Research 2 requirements.	1. Publish the SPaRe Kit for a larger scope of usage. 2. Make an interactive version of software of the SPaRe Kit in the online access for the synchronous online learning modality	Teachers Students Publication Agency	Year-round	Students show active participation, enthusiasm and high percentage of submission of written works and performance tasks in the subject.
To enhance the quantitative research skills of the students.	1. Make an e-book version of the SPaRe Kit. 2. Publish the e-book version of the SPaRe Kit for wider access and use. 3. Provide more practical activities that will help the learners improve or practice the different research skills as guided by detailed rubrics.	Teachers Students	Year-round	No student gets a failing grade in the Practical Research 2.
To supplement a strategy/intervention with the existing learning material to	1. Make a strategic activity/calendar planner in the	Teachers Students	Year-round	Students use and follow religiously the activities

reduce academic procrastination among the students.	SPaRe Kit to improve the strategies of the learners in accomplishing research tasks and avoid procrastination.			written in their activity/ calendar planner. There are no late submission of outputs.
To help the community in addressing the need for more quality, highly localized and contextualized, and relevant learning material.	1. Propose the use of the learning material on a larger scope of area. 2. Publish the learning material so that many students could benefit on it.	Education Program Supervisors School Heads Teachers Publishing Agencies Students		Other schools adopted the learning material and achieved a high rate of passing rate among the students.
To enhance the parts of the SPaRe kit that were found weak or needed to be improved.	1. Improve the design and layout by seeking the help of layout artists and graphic designers. 2. Seek for the professional constructive criticism and consultation of the grammar experts for a more quality and accurate learning tool.	Teachers Layout Artists English Critic/ Grammarian	Before the start of the School Year	Improved and errorless learning material.

To evaluate the effectiveness of the SPaRe Kit as a learning tool in Practical Research 2.	1. Conduct annual evaluation of the learning material. 2. Conduct action research by replicating or modifying the setting, respondents or research locale.	School Heads Teachers	Year-round	Reports on evaluations were done and researches were conducted.

Conclusions

In this study, the following conclusions were derived:

1. The Grade 12 students have a high and positive assessment on the Language and Mechanics, Usability, and Potential Effectiveness of the SPaRe Kit as their learning tool in Practical Research 2 class.
2. Grade 12 students' level of academic motivation before the use of the SPaRe Kit is "fairly motivated". After the use of the SPaRe Kit, students' motivation shifted to "highly motivated" at the end of the semester.
3. Grade 12 students' level of research skills before the use of the SPaRe Kit falls under "moderate ability" level. When the use of the SPaRe Kit was done, students' level of research skills shifted to "strong ability" level.
4. Before the use of the SPaRe Kit, Grade 12 students were found to be weak in critical thinking, ability to work with numbers, writing the hypothesis, writing the review of related literatures, deciding and writing on proper research designs, deciding and writing proper sampling technique, deciding, writing and carrying out statistical techniques, and analyzing data.
5. The overall research skills of the Grade 12 students increased from "moderate ability" to "expert ability". On technical research skills, it has

been found that the SPaRe Kit made an effect on students since their research skills shifted from "moderate ability" to "strong ability".

6. There is a significant difference in the level of academic motivation of the Grade 12 students before and after the use of the SPaRe Kit. This meant that the SPaRe Kit contributes positively in increasing the level of academic motivation of the students in Practical Research 2 during the pandemic.
7. It has also been found in this study that there is a significant difference in the level of research skills of the Grade 12 students before and after the use of the SPaRe Kit. Thus, it is concluded that the SPaRe Kit contributes positively in increasing their research skills of the students even during the implementation of distance learning.

7. Recommendations

Results and conclusions of the study helped in crafting the following recommendations:

1. The Education Program Supervisors in-charge of the Research Subject may recommend the use of the SPaRe Kit to Practical Research 2 teachers in the senior high school as it was found effective to increase academic motivation and research skills.
2. School heads may encourage their teachers to develop their own learning material that is highly localized and contextualized as to address the further needs for quality learning materials suited for distance education and that can maintain the motivation of the students for learning.
3. Teachers may develop their own learning material that addresses the need for the improvement of the other variables among the students like critical thinking, time management skills, study habits, and the like. Other

teachers may also design and develop learning materials that will uphold the potential students for dropping to retain for schooling.

4. The teachers are encouraged to print the learning materials in colored and not in plain black and white as criticize by the learners, so as not to distress the quality of the materials without affecting the designs and purpose of the study.
5. The content writers, layout artists, and editors may consider the results of the study in improving future learning materials when it comes to the quality of the content, language and mechanics, usability, and potential effectiveness as a learning tool.
6. The students may use the SPaRe Kit to achieve the necessary competencies needed to conduct quantitative research.
7. The future researchers may replicate the present study by modifying the variables used in the study or making their own intervention plans. It is also recommended that the study could be conducted by using a higher type of experimental design such as true experimental or quasi-experimental.

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