



## Research-based learning in various pedagogies for grade 12 students in the new normal

John Salvador R. Buque <sup>a</sup>

### Abstract

Research-based learning is one of the essential skills of 21st-century SHS students as well as skills such as collaboration, creativity, communication, and critical thinking (Gonzales, 2020). This practiced autonomous learning aims to improve student learning. However, according to the recent PISA study of Asian students' educational competencies at the secondary level (Organization for Economic Cooperation and Development, 2018), the Philippines had the lowest scores among the participants countries in literacy and numeracy. Most students find difficulties using computers, gadgets, and the internet; however, this is not a hindrance to improving the technology-based learning of the students and developing their skills using reading literacy and research skills. Therefore, this study aims to find alternative learning instructions for conducting research-based learning by using technologies across different educational pedagogies. This research was designed as quantitative research, describing the students' preferred technologies for instructions. The researcher described the students' preferred technologies for instructions. The data gathered was interpreted using descriptive analysis. The significance of this study will help design improvements to students' research skills in using technologies for study. Through the research results, the school administration can construct the school guide and policy based on the needs and relevant programs for the learners.

*Keywords: Research-based learning, technological advancement, creative writing, 21<sup>st</sup>-century skills, metacognitive learning, self-directed learning*

### Introduction

Research-based learning has a significant role for SHS students to practice as preparatory for tertiary-level education in which research becomes crucial. Moreover, this approach improves investigation and study skills to become meaningful learning related to societal issues. As 21st-century learning skills need appropriate practices and discipline, the research skills approach guides the improvement of multi-skills such as communication, collaboration, creativity, and critical thinking in searching for information and data for the study's objectives.

Research-based learning is an essential approach in today's educational context. Developing learners' research skills enhances the capability to answer personal, social, and academic inquiries to align based on the contextualized themes and topics that fit the lines of the learners. If the students have goals and objectives in the study, it will be both meaningful and purposeful in real experience in building knowledge.

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<sup>a</sup> **CORRESPONDING AUTHOR:** [johnbuque09@outlook.com](mailto:johnbuque09@outlook.com)

Research-based learning delivers learning in which the learners collect the data, find the problems, interpret, analyze, and solve the problems in systematic ways of process. Furthermore, research-based learning encourages learners to communicate with their classmates by exchanging thoughts and ideas in the lessons, which collaboration skills develop using technological communication creativity and applications to gain further knowledge.

### ***Research-based learning of senior high school students***

Research-based learning lessons use reasoning ability to solve problems. Thus, research-based learning activates essentially the students' engagement and critical thinking skills in the meaningful process. According to Rowe et al., (2021), RBL produced a positive active, and self-regulatory learning program for the consistency of reflective, critical thinking, and community learning in which the teachers need to conduct research to practice students' collecting information for study, thus, become the transitional education to secondary level. Research-based learning builds strong leaders in a society with skills in solving and discovering new knowledge. As with Wessels et al., (2021), RBL improves effectively cognitive, affective, and psychomotor for increasing student engagement. The public school scenarios, teachers follow strictly the curriculum (most essential learning skills) in the schools. Still, in every activity, the teachers should encourage the students to engage in the research strategies. The step-by-step search for knowledge processing improves the various learners' skills. Gallou and Abrahams (2018) studied a research based-learning program that created active participation using visualization which involves a technological application that encourages the students to engage by working together with their classmates. Students actively participate in research inquiry-based to find solutions to problems (Marie, 2018). In which they practice leadership as the aim of 21st-century learning goals.

Practicing research-based lessons generated positive results in students' cognitive and emotional learning during the study of Behrmann (2019). Research is essential in the academic study because it involves learning pedagogies such as problem-based, sociocultural practices, case-based, and inquiry-based learning. The combination of research-based learning and research-design learning helps the learners conduct research in collaborative ways in which the learners demonstrate learning in the school's educational activities (Jacobsen et al., 2018). Research-based learning has skills to accomplish the outputs using critical thinking, communication skills, gathering data, and evaluating the whole research scenario. Based on Yukel (2019), the students constructed knowledge using inquiry-based learning that can handle numeracy, literacy, and reasoning.

### ***Self-directed learning or self-regulatory learning***

Self-directed learning improves the self-regulatory learning strategies to cope with the difficulties of lessons at the same time everyday problems while the students train themselves to communicate with groupmates and analyze their past performances or actions. Ribéreau-Gayon and d'Avray (2018) stated that research-based learning is an interdisciplinary subject where students can be able to practice their self-regulatory skills, professionalism, and intrapersonal skills. Furthermore, in self-regulatory or self-directed learning students improve their collaboration with other classmates and enhance creativity in self-management at school, in which students develop the ability to think well in answering and solving the struggles in their studies.

Although students experienced difficulties in both online and modular learning modalities during the pandemic, this indicated that the students are still adapting to the new learning modalities and the current education system. Moreover, various modalities opened

the opportunity to access new learning modalities, such as research-based learning, which develops self-regulatory for their learning responsibility by constructing ideas in the research as a process. As Dafik et al., (2019) stated the students practice metacognitive learning, including planning, monitoring, and evaluating in the classroom. The students train to be autonomous learners in research-based education. Self-learning discovery had a significant impact on the student's long-term memory due to the process of critical thinking. The learners' initiative improves self-regulatory, which is necessary for the 21st century, such as collaboration, creativity, cooperation, and communication. The spiral learning process of the students constructs the verified and confirmed knowledge that the students gathered.

Thus, research-based learning leads to self-directed learning in which students are responsible for the learning process and development. Through self-directed learning, students can improve communication skills to gain various knowledge in searching the information by doing alone, learning autonomous learning in the giving assigned tasks. Despite working alone, the learners need to collaborate with others in self-guided learning. Thus, students develop creativity in management in various lessons at school, including the ability to think critically in the lessons. self-directed and adult learning theories – according to Maslow (1970), in his "Hierarchy of Needs", humans are motivated to attain the level of needs from physiological needs (lowest level) to self-actualization (highest level). In humanistic theory, adult learners have the freedom and responsibility already to manage their learning, which underlines self-directed learning and the values of experience (Merriam & Cafarella, 1999 cited by Bélanger, 2011).

### ***Project-based learning***

Project-based learning is the extension of the school and outside-the-school activities for expanding the knowledge in the lesson. As Almulla (2020) stated, collaborative learning (CL), disciplinary subject learning (DSL), authentic learning (AL), engagement in learning (EL), iterative learning (IL), and included project-based learning (RBL) had positive effects to the engagement of students in the lesson activities. This learning system or program explored the real events of problems and challenges. In addition, RBL designed a project that will improve students' communication in which students gather information and knowledge in objective ways. Moreover, project-based learning improves cooperation in learning, as Arantes do Amaral and Lino dos Santos (2018) discovered that the combination of both project-based learning and community-based learning enriches the learners' experiences that solve problems in their surroundings. As with Wessels et al., (2021), research-based learning effectively improves cognitive and affective aspects, increasing student engagement. Project-based learning is the instructional design in which the students can be able to accomplish their tasks with their groupmates in the classroom. Therefore, group ideas can enhance new ideas and knowledge. Students have time to manage and plan the learning activities given by the teachers. Through project-based learning, students become innovative in their school tasks. Likewise, the PBL design project develops groupings in the class, which improves individual creativity. Therefore, learners produce output competencies. Additionally, project-based learning improves the students' critical thinking for constructing the projects made by the teachers. At the same time, PBL improves the learning capacity to think of step-by-step tasks in class.

Project-based learning in RBL develops communication because the students will be curious about the lessons and tasks given, such as projects at school that need to be solved. Therefore, students form groupings which help them to improve socialization and interaction in the group. In this way, learners improve their creativity in solving various tasks that improve them to look for insight and knowledge.

### *Community-based learning*

Community-based learning is an instruction or program in which the students engage in their surroundings in reflection and connection with the community. Furthermore, direct contact in engagement with the community has a significant impact on learning. The collaboration develops with their classmates and the community within them. It also improves creativity in solving the community problems as the members. At the same time, CBL expands the ability to critical thinking of the learners because of socialization.

In experiential learning theories, Bélanger (2011) refers to learners who experience a real situation that relates to their prior discovery learning to solve the problem. Through research-based learning, the students take the initiative to solve societal issues and their surroundings, which are for the benefit of community and self-learning development. Students are constantly seeking alternative solutions in their surroundings in meaningful ways. The learners consider their study with the purpose can bring across learning subjects by exploring the situational topic in the various subject areas. Community-based learning improves active reading literacy as part of research-based learning. Kador et al. (2017) stated learners experience learning materials or cultural materials that improve their knowledge in the real world when conducting research.

According to Gan and Ocampo (2021), active reading positively impacts the behavioral and affective learning dimensions of the learner who needs community involvement. Furthermore, community-based learning has positive effects on the learners' literacy learning of the students. It involves the affective, behavioral, and cognitive components of the learners in engaging in community activities such as reading in every locality. As well as in 2021, Gruppen and Fogarasi studied the students' learning environment connected with the learners' well-being in their surroundings. However, conducting research-based learning considers the learning environment of the students due to probable causes of burnout and depression in psychosocial learning. Learning awareness, wellness, and learning environment are essential to understanding the intervention of the learners. Therefore, the environment should consider the surroundings of the students.

The learners need to engage with their surroundings as part of the learning. It molds the initiative in learning. Also, Senior High school students are preparatory for the tertiary level, which needs autonomous learning at school. As the study by Kastner and Mostchilnig (2022), the students formed the adult basic education with the participation of the community and transformative learning. The interconnectedness of adult learning and community increased self-empowerment, participation, and humanistic point of view in society. Mayer et al. (2019) suggested having numerous workshops to improve the involvement of the learners. Community-based learning encourages students to experience community status which leads to self-efficacy, motivation, and research skills. The learner experiences, too, lived in the real world in learning. Moreover, CBL becomes meaningful in experiencing the surrounding and sociological scenario of the community.

The learning student's community-based related the projected-based learning as part of their lesson activities. Almulla (2020) found out that project-based learning positively affects the learners' participation and engagement in every activity. The learners improve long-term memory by strengthening using the research process. Using scientific inquiry, the learners add more information to their memory for learning and skills as well.

Community-based learning involves community tasks in the community issues, which students become more aware of various problems in students. Surrounding likewise, the

barangay, school, and various sectors, in which the students apply their knowledge in real-life situations. The collaboration of the learners deals with the collaboration participation with groupmates because the work will be done if groupmates participate. It also creates activities that look for the community problem that will be solved through the application of the knowledge. Therefore, this activity can expand the ability to think about the community's needs in the classroom.

### ***Problem-based learning***

Improving problem-solving skills is one essential learning skill in academics and daily activities at home or school. According to Jugueta (2021), through Problem-solving prompts, the student conceptualizes and solves the problem in their subjects. There are positive relations between conceptualization, understanding, and solving problems. Scott (2017) mentioned that - Students' experiences are essential for firm knowledge; therefore, Problem-Based Learning (PBL) and Action Learning (AL) practice the students' real situational challenges in their surroundings. PBL and AL train the students' leadership to face difficulties in their studies. The students exposed to many problem-solving activities had high performance in solving various tasks. Problem-based learning develops self-efficacy in answering the questionnaire and achievement test so that students become independent learners (Masitoh & Ftiriyani, 2018). In which students practice the ability to find the problem, as Yuksel (2019) found in the study, inquiry-based learning got higher scores in the SRST post-test. It indicates that the learning program provided the learners with better correlation thinking and hypothetical reasoning in the study.

Research develops problem-solving skills in communication with fellow students and teachers. Communication is an essential skill of senior high students for their coming tertiary level and professional growth. In research, the students practice communication in the academic processes. However, some students cannot solve the problems because of the lack of communication which leads to a lack of collaboration in the activities at school. Through research, students collaborate with the students through step-by-step group solving in the classroom. In which the students construct knowledge in creative ways by gathering data, analyzing, and evaluating the problem in the classroom. Therefore, it will strengthen students' ability to evaluate the entire scheme of the problems. By improving the camaraderie of groupings in the classroom with their classmates, students enhance their self-directed learning by doing activities.

Problem-based learning allows the learners to know various societal problems that apply in society, for personal purposes, academic, and professional purposes. Therefore, the students can communicate with others to know the scenarios that the problem emerges in the research location. In problem-solving solutions, the researcher needs to exercise collaboration in the research team, that conducts essential skills of the learners. Thus, learners produce meaningful outputs, and products, because they struggle with their evaluative thinking skills to solve the problems of society.

### **Objectives of the Study**

This research intended to explore the students' preferred research-based learning in the students' study which helps them to cope with the various difficulties in modality. Moreover, the researcher aimed to investigate the advantages and disadvantages of research-based learning. Specifically, this study aims to answer the following questions:

1. What types of research-based learning are preferred by senior high students?
2. What is the research-based satisfaction of senior high students in the classroom?

### 3. What are the disadvantages of group work for senior high school students?

It is hypothesized that self-directed learning is the preferred research-based learning of SHS students of grade 12 in research-based education in which students practice autonomous learning which uses their critical thinking skills.

This autonomous learning is in which the students take initiative and responsibility for their knowledge by improving their self-directed learning, which is written by Flavel (1979), in which students can able to plan, monitor, and evaluate lessons. Besides, they can be able to communicate with their groupmates, which develops through project-based learning by cooperating with groupmates. The students look forward to the target learning goal with their classmates that will improve individual creative learning by constructing knowledge of experience. Additionally, the learners improve experiential knowledge by exposing themselves to the community. Besides, community-based learning builds a solid structure of knowledge through real situations and events in society so that the learners become responsible for the societal problem happening in our society which practices their critical thinking ability and their concern with society.

At the end of self-directed, project-based, community-based, and (problem-based learning), the learners will improve 21st-century skills such as creativity, collaboration, communication, and critical thinking. The learners construct the body ideas with the collaboration of group knowledge which builds the students' creativity by creating a unique originality of their innovation. The students practice communication with their fellow students, teachers, and the community. Through experience, the students have a firm foundation of knowledge so that they can develop their critical thinking ability to solve problems, while teachers have a guide to aid their awareness in teaching research-based learning approaches.

## Methods

This presents the research methodology in the research process: research design, locale, respondents, sampling procedures, instrument, validity and reliability, data gathering, statistical tools and analysis, and ethical consideration.

### Respondents and Locale

This research aims to know the various perspectives of the participants, so the researcher decided to use qualitative research to investigate the learners' preferences in studying in a research-based learning approach. The research was conducted somewhere in a public school in Antipolo City, which is known as one of the largest numbers of populations. While selecting the participants, the researcher the standard of qualification such as (1) the students should be enrolled in the semester, (2) the student takes English for Academic and Professional Purpose (EAAP), and (3) the student is regular in the study.

The participants were a total number of (243) two hundred forty-three from General Academic Strand (GAS), Humanities and Social Science (HUMSS), and Open High School OHS students in public schools in Antipolo City. To get the ideal number of participants, the research used five percent marginal errors for the total students enrolled in the mentioned strands. Using Slovin's formula found at least (151) hundred fifty-one SHS students.

### Data Gathering Procedure

Initially, the researcher asked permission to conduct the research survey in the classrooms in the school. It is intended to observe the school ethical approval to gather the

data, after the approval of the school head, then the research distributed the research survey to look for the students' and teachers' perspectives on the classroom practice in research-based learning preferences of the senior high school students.

After the approval of the principal to conduct research, the researcher distributed the survey questionnaire to the selected strands of senior high school students in the intended location. Before the distribution, the researcher gives the instructions and asks permission from the participants. Due to the online learning modality, the researcher utilized online surveys such as Microsoft Forms to answer the participants including the research consent to the participants for answering the questionnaire.

### **Research Instrument**

To measure the students' research-based approach, the research utilized a 5-point Likert scale (1= Very dissatisfied, 2=Dissatisfied, 3=Neutral, 4= satisfied, 5= Very Satisfied) to get the perception of senior high school students in terms of research-based learning in self-directed learning, project-based learning, community-based learning, problem-based learning, and last the disadvantages of research-based learning.

The research needs to self-made instrument to measure the preferable. The research was validated by two content validators in senior high school faculty in research, social studies, and business management as learners and knowledgeable in their field for validation of survey content using research instruments.

### **Statistical Tools and Analysis**

According to Creswell and Creswell (2018), the descriptive analysis frequency of the participants' answers in terms of mean, mode, median, and standard deviation for identifying the answers of the participants in the survey. The researcher worked with descriptive statistics to calculate the variables in the research. The research counted the frequency distribution and percentage and ranked the data. Moreover, the second part of the research survey counted the weighted mean, standard derivation, and the total average weighted mean to interpret the data while using verbal interpretation.

### **Ethical Consideration**

Yin (2018) mentioned that providing permission consent to the school head or the participant before conducting a survey is essential for the research process ensuring the awareness of the subjects. Therefore, the researcher asked the permission of the school head to conduct a research survey, then after the approval of the school. The students need to be fully aware of the research objectives, and nature, explain that the survey is highly confidential, and maintain privacy for gathering data. The researcher ensured that the survey questionnaire was not harmful to the students. The survey ensured no harm while conducting it and explained the nature of the research with volunteerism to back out whenever they felt uncomfortable.

### **Results and Discussions**

This part consisted of the demographical profile of the respondents, preferred activities of senior high school students in RBL, Senior high school students in research-based learning in 21st-century skills, Self-directed Learning of Senior High School Students, Project-based learning of senior high school students, Community-based learning, Problem-based learning, and Disadvantages of Research-Based Learning.

Demographical profile of the respondents

**Table 1.** *Demographical Profile*

Demographical Profile	Total		Rank
	<i>f</i>	%	
<b>Sex</b>			
Male	60	40%	2
Female	90	60%	1
<b>Total</b>	<b>150</b>	100.0%	
<b>Age</b>			
16-17	51	34%	2
18-19	78	52%	1
20-21	12	8%	3
22 above	9	6%	4
<b>Total</b>	<b>150</b>	100.0%	
<b>Strands</b>			
GAS A 12	19	12.7%	4
GAS B 12	17	11.3%	5
GAS C 12	23	15.3%	3
HUMSS C 12	47	31.3%	1
HUMSS D 12	34	22.7%	2
OHS 12	10	6.7%	6
<b>Total</b>	<b>150</b>	100.0%	

Table 1 above shows the demographical profile of the respondents in sex, age, and strands/ grades, which are all from senior high school in the year 2022-2023.

The table showed that most of the participants were female, with 90 students (60%), followed by 60 male students (40%) in senior high school, grade 12. It indicated that the total population and participation of the survey were female than male respondents.

The age range from eighteen to nineteen years old students had the highest number of participants with 78 (52%), followed by the age of sixteen to seventeen with a total number of 51 (34%) respondents. On the other hand, twenty-two above got the lowest number of participants with 9 (6%). The K to 12 Basic Education Program (R.A. 10533) revised the entry age for senior high school from age sixteen to seventeen ("An Act", 2013); however, there are still eighteen- to nineteen-year-olds who are part of the age entry. At the same time, the lowest number of participants is twenty-two and above, which is over age in the level.

The largest number of participants from senior high school strands was HUMSS 12, which consisted of 47 (31.3%), followed by HUMSS D, with thirty-four (22.7%). In comparison, the Open High school students got the lowest number of participants, with only 10 (6.7%). The data showed that the number of populations per strand depends upon the number of populations in the survey.

**Table 2.** Preferred activities of senior high school students in research-based learning

Items	SD (1)	D (2)	N (3)	A (4)	SA (5)	Weighted Mean	SD	Ranks	Verbal Interpretation
<b>Preferred research-based learning</b>									
Grouping Activities	8	9	25	59	49	3.88	1.97	2	Acceptable
Community-based Activities	7	12	42	54	35	3.65	1.91	4	High
Lecture discussion	9	6	21	64	50	3.93	1.98	1	High
Problem-solving	7	13	49	57	24	3.52	1.88	7	High
Game-based learning	10	12	39	51	38	3.63	1.91	5	High
Online instruction	4	14	48	55	29	3.61	1.90	6	High
Project activities	7	9	34	65	35	3.75	1.94	3	High
<b>Average Weighted Mean</b>						<b>3.71</b>	<b>1.93</b>		<b>High</b>

Table 2 above presents the numbers of the students' preferred types of research-based activities in the classroom. Based on the table shows that lecture discussion got the highest rank with a 3.93 weighted mean, while second, grouping activities found 3.88 next to the highest, then the third, project activities had 3.75, which is all verbal interpretation is high. On the other hand, online instruction got the lowest weighted mean with 3.61; still, the verbal interpretation is high. The data indicated the students need the teacher's assistance in direct instruction with the teacher and students in the class by lecturing and explaining the research stage. Afterward, the teacher will group the class as part of the research that had good study benefits. The final output for research is essential. Senior high school students choose project activities as individual outputs that improve their self-directed learning and self-evaluation of the outputs.

**Table 3.** Senior high school students in research-based learning in 21st-century skills

Items	SD (1)	D (2)	N (3)	A (4)	SA (5)	Weighted Mean	SD	Rank	Verbal Interpretation
<b>Research-based learning</b>									
1. Research activities encourage me to communicate online with my classmates/ teachers.	15	2	35	67	31	3.65	1.91	4	High
2. Research tasks help me to collaborate with my	8	5	34	72	31	3.75	1.94	2	High

classmates/teacher online.										
3. Research activities guide me to be creative using technological applications.	6	7	29	64	44	3.89	1.97	1	High	
4. Research activities lead me to reason using instructions online.	5	9	46	62	28	3.66	1.91	3	High	
<b>Average Weighted Mean</b>						<b>3.74</b>	<b>1.93</b>		<b>High</b>	

Table 3 shows that research-based learning guides them to be creative using technological applications, which got 3.89, the highest weighted mean which verbal interpretation is high. It indicated that creative skills improve in the use of research-based learning approach to the senior high school students of grade 12. While the research-based activities encourage them to communicate online with their classmates got the lowest weighted mean of 3.65, and the verbal interpretation is high. Salazar (2020) mentioned that workshops positively affect choosing instructional materials as well as communication. Therefore, communication online implies that students find difficulties in using online learning in research-based learning.

**Table 4.** *Self-directed Learning of Senior High School Students*

Items	SD (1)	D (2)	N (3)	A (4)	SA (5)	Weighted Mean	SD	Rank	Verbal Interpretation
<b>Self-directed learning</b>									
5. Research activities train me to communicate and work alone with my assigned tasks.	7	10	32	61	40	3.78	1.94	3	High
6. Research improves collaboration while doing with my plan.	5	10	31	70	34	3.79	1.95	2	High
7. Research activities enhance my creativity in self-management.	7	10	32	69	32	3.73	1.93	4	High
8. Research activities develop	7	10	17	72	44	3.91	1.98	1	High

my ability to think.

<b>Average Weighted Mean</b>	<b>3.80</b>	<b>1.95</b>	<b>High</b>
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Table 4 presents the self-directed learning that students develop their ability to think got the highest weighted mean, 3.91 which verbal interpretation is high. It means that the use of self-directed learning develops the capacity of the learners to think and analyze lessons by themselves. While the students enhanced their creativity in self-management, found the lowest weighted mean of 1.93 still, verbal interpretation is high.

**Table 5.** *Project-based learning of senior high school students*

Items	SD (1)	D (2)	N (3)	A (4)	SA (5)	Weighted Mean	SD	Rank	Verbal Interpretation
<b>Project-based learning</b>									
9. Research activities design project that improves my communication.	5	8	30	74	33	3.81	1.95	2	High
10. Research tasks design project that develops groupings.	8	4	32	65	41	3.85	1.96	1	High
11. Research activities improve my creativity in every project.	11	8	32	69	30	3.66	1.91	4	High
12. Research designs a project that teaches me to think in a step-by-step task.	6	10	28	69	37	3.81	1.95	3	High
<b>Average Weighted Mean</b>						<b>3.78</b>	<b>1.94</b>		<b>High</b>

Table 5 above found that the research-based learning design project that develops groupings resulted in the highest weighted mean of 1.96; thus, the representation of grouping activities design produces positive effects for the learners. In contrast, research-based improved creativity in every project got the lowest weighted mean of 1.91, which is verbally interpreted as high. Project-based learning develops teamwork/collaboration, self-esteem, and motivation for the student's activities (Catacutan & de Guzman, 2017). It points out that students found tasks become easy because of creative work in grouping in project-based learning.

**Table 6.** *Community-based learning*

Items	SD (1)	D (2)	N (3)	A (4)	SA (5)	Weighted Mean	SD	Rank	Verbal Interpretation
<b>Community-based learning</b>									
13. Research activities engage in community needs and experiential learning.	4	9	49	57	31	3.68	1.92	4	High
14. Research tasks develop collaboration with classmates and the community.	5	8	39	66	32	3.75	1.94	2	High
15. Research activities improve my creativity to solve every problem in our community	6	9	40	64	31	3.70	1.92	3	High
16. Research expands my ability to think critically about community needs.	6	9	36	64	35	3.75	1.94	1	High
<b>Average Weighted Mean</b>						<b>3.72</b>	<b>1.93</b>		<b>High</b>

Table 6 shows that community-based learning expands the ability to think critically about the community needs, which got the highest weighted mean of 1.92 in the verbal interpretation of high. On the other hand, community-based learning engages in community needs and ex, and experiential learning was found to have the lowest weighted mean of 1.92, with a high verbal interpretation. Arantes et al. (2018) found that the combination of community-based learning and project-based learning found that students learn to manage their schedules in the study, improve learning, experience meaningful learning, and successfully develop research skills in the classroom. The student reflects on their learning through their experiences in the community (community-based learning) and education experience (project-based learning)

**Table 7.** *Problem-based learning*

Items	<i>SD</i> (1)	<i>D</i> (2)	<i>N</i> (3)	<i>A</i> (4)	<i>SA</i> (5)	Weighted Mean	<i>SD</i>	Rank	Verbal Interpretation
<b>Problem-based learning</b>									
17. Research activities practice my communication in problem-solving.	7	9	31	73	30	3.73	1.93	3	High
18. Research exercises my collaboration in solving the problem with the group.	5	9	34	70	32	3.77	1.94	2	High
19. Research activities increase my ability to be creative in solving problems.	8	11	35	64	32	3.67	1.92	4	High
20. Research tasks strengthen my ability to evaluate the problem for solution.	6	9	26	73	36	3.83	1.96	1	High
<b>Average Weighted Mean</b>						<b>3.75</b>	<b>1.94</b>		<b>High</b>

Table 7 above shows that in problem-based learning, students strengthen their ability to evaluate the problem for the solutions, which got the highest weighted mean of 1.96 in verbally interpreted as high. While the students' research problem-based learning increases their ability to be creative in solving problems got the lowest weighted mean with the verbal interpretation of high. Valdez & Bungihan (2019) found that problem-based learning showed the students enhanced their problem-solving skills by evaluating the situation in their surroundings. The students think critically in problem-solving learning activities.

**Table 8.** *Disadvantages of Research-Based Learning*

Items	SD (1)	D (2)	N (3)	A (4)	SA (5)	Weighted Mean	SD	Rank	Verbal Interpretation
<b>Disadvantages of RBL</b>									
1. Some groupmates depend on the leaders.	18	21	45	40	26	3.23	1.80	3	Moderately High
2. Research group work made slow progress.	18	33	55	35	9	2.89	1.70	5	Moderately High
3. Some students need to access and encourage.	6	8	28	65	43	3.87	1.97	1	High
4. There is an unfair distribution of tasks.	16	28	50	36	20	3.11	1.76	4	Moderately High
5. Some students did not participate.	19	22	36	47	26	3.26	1.81	2	Moderately High
6. There is no fair grading system.	30	30	50	30	10	2.73	1.65	6	Moderately High
						3.18	1.78		Moderately

Table 8 presented the research-based learning disadvantages of the senior high school that some students need to access and encourage got the highest weighted mean of 1.97 and in the verbal interpretation of high. Meanwhile, there is no fair grading system that has the lowest weighted mean which is verbally interpreted as moderately high. It implied that senior high school students improve their study in self-directed learning using research-based learning. There are obstructions to implementing research-based learning in schools. Rattanaprom (2019) said that there are four aspects of the barrier to implementation such as teacher mindset, teaching methodology, curriculum design, and academic leadership. Therefore, a hindrance to conducting research based on the design of the school, teachers, and students' interests.

**Table 9.** *General average weighted means*

Items	Weighted Mean	SD	Rank	Verbal Interpretation
Research-based learning	3.74	1.93	4	High
Self-directed learning	3.80	1.95	1	High
Project-based learning	3.78	1.94	2	High
Community-based learning	3.72	1.93	5	High
Problem-base learning	3.75	1.94	3	High
Disadvantages of research-based learning	3.18	1.78	6	Moderately High

Table 9 shows the general average weighted mean of senior high school students whose self-directed learning got the highest weighted mean of 1.95, which is verbally interpreted as high, and the lowest weighted mean disadvantage of research-based learning. The table revealed that senior high school students preferred self-directed in their research-based learning. This research is anchored in self-directed and adult learning theories – according to Maslow (1970), in his "hierarchy of needs", humans are motivated to attain the level of needs from physiological needs (lowest level) into self-actualization (highest level). In humanistic theory, adult learners have the freedom and responsibility already to manage their learning, which underlines self-directed learning and the values of experience. (Merriam & Caferella, 1999 cited by Bélanger, 2011).

### **Implications and Recommendations**

Research skills are essential for the preparation for the tertiary and professional level of senior high school students. Due to the pandemic, various pedagogies, approaches, and methods during pandemic emerged as teaching strategies to reach students in need. Based on the data provided, the students agreed to research-based learning in the school. The data found that the students chose lecture-discussion, grouping activities, and project activities in the school. It implied that students preferred this learning approach to practice their skills in groups and on their discovery. Therefore, research-based learning is not only for self-study still. It includes socialization in gaining and finding the right answers to the research problems.

The data found that the students develop creativity using technological applications in research-based learning. The implication showed that research-based develops innovation and students' ability to produce learning outcomes in their study. On the other hand, they are developing self-directed learning, which improves the critical thinking ability of the learners by practicing autonomous learning and metacognition of learning, such as planning, implementing, and evaluating the product. Designed by the teacher, the students develop grouping skills and socialization skills with their fellow students as part of research-based learning. Students can do it with other classmates. At the same time, students expand their critical thinking by exposing them to the community needs and problems in society. It also strengthens the ability to evaluate problem-solving skills in systematic ways of learning.

The researcher recommends that future researchers try to enhance curriculum design for research-based learning for all subjects. The teachers also find activities aligned with the research-based approaches in the classroom and motivate the learners to become independent learners. The senior high school can practice self-directed learning or a self-regulatory learning process; therefore, the teacher will instruct and design a learning plan aligning with the metacognitive activity of the learners. The school administrators guide the teachers for the program and community activities which involve experiential learning not only in the four corners of the classroom.

### **AUTHOR INFORMATION**

**John Salvador R. Buque** is presently an English subject teacher 3, for grades 8 and 9, at San Jose National High School in Antipolo City. He is pursuing a Doctor of Education in Language and Literature at Far Easter University Manila. He obtained his Master of Education, Major in English Teaching and Instruction, at FEU Roosevelt, Cainta. He graduated from the Institute of Creative Computer Technology in Cainta, where he took a Bachelor of Education with a major in English. His research interests are research-based learning, metacognition of students learning, contextual language in teaching, and he is currently working on his dissertation on dialogue in classroom teaching.

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