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Gauging the Institution's Potential Towards an Entrepreneurial University: The Case of a Philippine State University

Ersyl T. Biray

Abstract

The potential of a state university for entrepreneurial university transformation is determined in this study by using the mixed method, specifically the concurrent triangulation design. Strengths, weaknesses, challenges and issues are highlighted based on the guiding framework for entrepreneurial universities by the European Commission – Organization for Economic Cooperation and Development (EC-OECD). Middle level managers of the institution served as participants providing data through survey instrument and interviews. Results revealed that generally the university is Going Entrepreneurial, particularly in leadership and governance; organizational capacity, people and incentives; entrepreneurship development in teaching and learning; and pathways for entrepreneurs. It is Almost Entrepreneurial in its business/external relationships for knowledge exchange, and as an internationalized institution; and only in measuring the impact of entrepreneurial university that it is described as Initially Going Entrepreneurial. Challenges and issues identified that may affect the internal system consist political leadership openness to support development plans and projects; presence of internationally-popular ecotourism, farm tourism, cultural and heritage tourism potentials; booming business atmosphere in the province and the region; availability of local and international scholarships and fellowships for staff and students; presence of commercial banks offering loan credits; and presence of private colleges and learning centers. Recommendations for internal policy consideration include the revisit and inclusion in the strategic plan of an entrepreneurial agenda; appropriation of budget to support the entrepreneurial projects or start-ups by the faculty, staff and students; and exploration of functional engagements and linkages with external (local and international) stakeholders and willing business partners, experts and entities who could help put up or invest on incubators, science parks and the like.

Keywords: *entrepreneurial, mixed methods, internationalized, start-ups, incubators*

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1. Introduction

There is a growing diversity of university typologies in the local, regional and international front today. Universities are required not only to prepare their students to serve the immediate needs of the market through a ‘seamless path to work’ approach but also encourage them to ‘create work’ through innovation and ingenuity. Under academic capitalism, the prime focus of universities, research institutes and higher learning has to be on developing creative human resource capable to putting innovative ideas to some practical use and profits (Gupta, 2008).

While most higher education institutions in western and European countries have transformed and practiced being entrepreneurial universities, only a few in the Asian region, and much less in the Philippines are into it. The concept of an entrepreneurial university starts with the orientation derived through entrepreneurship education. But entrepreneurship education was instituted by the Commission on Higher Education (CHED) as a formal degree program only in 2005. This means that the transformation of higher education institutions in the Philippines to become entrepreneurial universities is still at its infancy stage as compared to their counterpart in western countries. With the thrust on internationalization going on in the country’s higher education institutions (HEIs) for eventual competitiveness of business-oriented graduates in the global market, the immediate need to scan the environment becomes pressing.

A state university in Aklan, Western Visayas, Philippines aimed to become “an academic pillar of excellence for sustainable development”. Along its mission is producing “globally competent professionals, leaders and entrepreneurs” through its four-fold functions of instruction, research, extension, and production. It has become apparent that the university looks forward to be competitive with its neighbors in the region and beyond its borders on the entrepreneurial aspects of coming out with business-driven human resources who can initiate innovations and start-up activities that not only answer the basic necessities but propel economic growth in the communities, particularly that it is the only state-funded HEI in the province and among the top in the region. But has it functioned well as a producer of globally-ready entrepreneurs as it visualized to be since it implemented its strategic plan in 2013?

This study purposely determined a Philippine state university’s current status, and established its potential status for entrepreneurial university transformation. The strengths and weaknesses of the institution’s existing system was identified in order that appropriate recommendation to thwart challenges and issues affecting the system is forwarded to establish its

fitness for the entrepreneurial transformation. All the middle level managers of the institution participated in advancing the information on this aspect.

Specifically, this study determined the strengths and weaknesses of the university towards entrepreneurial university transformation in terms of leadership and governance, organizational capacity: funding, people and incentives, entrepreneurship development in teaching and learning, pathways for entrepreneurship, university – business/external relationship for knowledge exchange, the Entrepreneurial University as an internationalized institution, and measuring impact; ascertained the challenges and issues for the internal system with reference to EC-OECD Entrepreneurial Universities Framework; and established recommendations to preparation for entrepreneurial university transformation.

2. Literature review

2.1. Entrepreneurship and world universities

Traditionally, the universities and centers of higher learning were required to build a set of skills, attitudes and values that were necessary for effective participation in a particular civil society. Today they are required to build skill sets they can bargain with internationally as a commodity because having such skills or capacity can create more employment opportunities and even help in driving the advancement of local communities. Due to such wide concerns a wide range of governments in Asia are also keen to promote the concept of “entrepreneurial university” to bring greater advantages to the whole society.

As the economy has evolved from being driven by physical capital to knowledge, and then again to being driven by entrepreneurship, the role of the university has evolved over time. While the entrepreneurial university was a response to generate technology transfer and knowledge-based start-ups, the role of the university in the entrepreneurial society has broadened to focus on enhancing entrepreneurship capital and facilitating behavior to prosper an entrepreneurial society (Audretsch, 2014).

Some of these universities have varying strategic agenda for excellence while others work for strong alliances with industries, local government units (LGUs) and civil society organizations (CSOs) to sustain continuous growth and development in their human, physical and financial resources. By nature, entrepreneurial universities are involved in partnerships, networks and other relationships to generate an umbrella for interaction, collaboration and co-operation (Guerrero et al., 2014). It is essential for HEIs to find creative ways to encourage and develop strong university-

industry collaboration (UIC) to stimulate the establishment of startups for technocities or technoparks for internship programs of students (Genc et al., 2020). The support of public and public funding partners is important to assist in building entrepreneurial universities to reinforce the university-industry-government (UIG) linkages. The necessity of private funding support is to fill in the gap in technological development between universities and industries while those coming from the public as a catalyst in attracting private funding to bridge the gap between university and industry (Hu, 2009).

According to de Souza et al. (2017), to have an enabling environment for innovation, universities must have: the institutionalization of the entrepreneurship concept as well as mechanisms that make it possible; a strategic vision focused on transformation of academic environment; the mitigation of conflicts of interest resulting from traditional research vision of the university and profit of the institution; management of risks facing the process of change; and balance between demand and capacity to supply it.

In Latvia, a positive trend was observed on the cooperation among business incubators, higher education institutions and the local government but there is a need to put higher efforts to assist young entrepreneurs in building cooperation networks and strengthening knowledge cooperation with external stakeholders (Bikse et al., 2016). In Bulgaria and Portugal, Yordanova and Filipe (2019) found out that there are internal and external barriers and facilitators of entrepreneurial transformation and revealed the relative importance of these factors to the entrepreneurial transformation of the Sofia University.

Mok and Jiang (2017) found out that in Hong Kong and Shenzhen, China, the government established an Innovation and Technology Bureau, promoted smart city, innovation and entrepreneurship, knowledge transfer among universities, and facilitated start-ups and the incubation process by providing financial support for graduates. Universities are also encouraged to become entrepreneurial by commercializing academic research, strengthening collaboration with industry sectors, and encouraging students to engage in entrepreneurship.

Using the same framework used in this study, the EU-OECD, Alghamdi (2020) found out that academic leaders in Saudi universities perceived that entrepreneurship in their institutions were in a moderate level. Among the dimensions cited, Organizational Capacity, People, and Initiative had the highest rating. These were followed by Leadership and Governance, University-Business/External Relationships for Knowledge Exchange, The Entrepreneurial University as an

Internationalized Institution, Entrepreneurship Development in Teaching and Learning, and Measuring Impact of the Entrepreneurial University.

Velasco (2013) pointed out that ‘entrepreneurship in the Philippines is basically a necessity entrepreneurship’ where Filipinos go into entrepreneurial ventures to meet their basic needs. Unlike in western countries where entrepreneurship education covers the development of the students’ ability to start up a business and pursue opportunities in the larger business or economic ventures, business education programs in the Philippines develop students for employment rather than entrepreneurship. It lacks role models like entrepreneurs who espouse high opportunity high-growth undertaking. The curriculum is also focused in the preparation of business plans where most of which are not implemented, and the absence of an integrating course that blends the different disciplines of social science, humanities, technology, and the natural sciences. Thus, he suggests for the review and revision of the entrepreneurship curriculum, document role models, set up business incubation in the university, pursue research on entrepreneurship, and promote on-the-job training with entrepreneurs.

Gatchalian (2010) noted that “it is only very recent that entrepreneurship education is giving a push and gaining ground in the collegiate level as a full course”. It is implied that opening an entrepreneurship program is difficult considering the rigors of finding the human as well the academic resources to adopt, develop, and utilize. Today, higher education institutions in the country still treat entrepreneurship courses in the traditional scheme – large classes, contend to what resources are available, and require business plans left unimplemented – to produce manpower who employ to sustain their basic necessities.

However, in a national assessment conducted by the Erasmus+ Programme for Capacity Building in Higher Education in 2017 to benchmark the current situation of entrepreneurial environment in the Philippines, it found out that the majority of the Philippine HEIs consider the inclusion of entrepreneurship in their institutional strategy as moderately relevant. Thus, it recommends the embedment of entrepreneurship in every part of the organization, from leadership through its teaching and student impact.

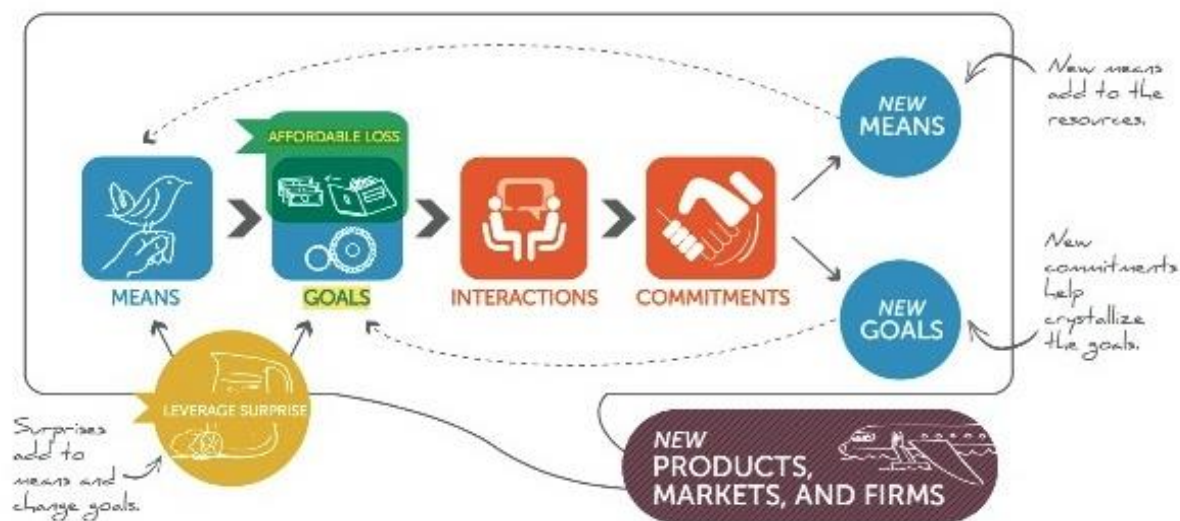
2.2.Theoretical and conceptual framework

This study was based on the Theory of Effectuation as advocated by Sarasvathy (2001). This theory describes “an approach to making decisions and performing actions in

entrepreneurship processes, where you identify the next, best step by assessing the resources available in order to achieve your goals, while continuously balancing these goals with your resources and actions. It has the fundamental principle called *Pilot-in-the-plane*, which describes the future as something one can influence by his actions and create his own opportunities.

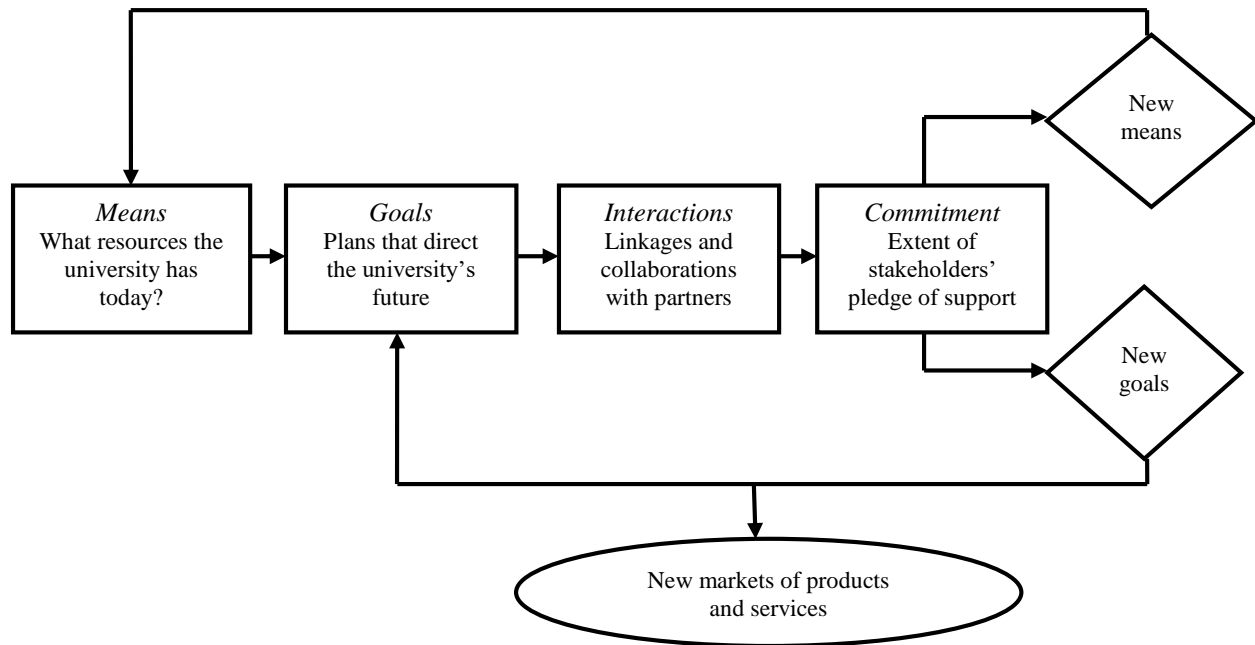
Figure 1

The Sarasvathy Effectuation Model



Source: <https://necrophonedotcom.files.wordpress.com>

In this study, *Means* included the available physical, financial, and human resources of the university today; *Goals* referred to the existing and future plans which guide the direction of the system; *Interactions* described how well the organization interacts, links, collaborate and work with partners in attaining the goals; and *Commitment* was about how stakeholders devote their selves on the pledges they have made. This commitment would bring about new sources of funding, experts, facilities, equipment, and other privileges that would expand and strengthen the resources of the university. It would also redound to the adoption of new goals towards attracting new markets of products and services produced by the university.

Figure 2*Conceptual Framework of the Study***3. Methodology**

This mixed methods research study used specifically the concurrent triangulation design. According to Creswell (2003), this design involves the collection of quantitative and qualitative data concurrently in one phase, analyzed separately and then compared and/or combined. This is used to confirm, cross-validate or corroborate findings within a study. It is often used to overcome a weakness in one method with the strengths of another. It can also be useful in expanding quantitative data through collection of open-ended qualitative data.

The participants of the study were all the middle-level managers of the state university composed of the deans of schools and colleges, and heads of service units who are in-charge of production and income generation during the study period in 2019. They were selected considering their knowledge of the system in academic and administrative aspects of management.

The EC-OECD Entrepreneurial Universities Framework was adopted as a standardized instrument to establish how is the university ready for entrepreneurial university transformation, as well as the presence or absence of necessary policies and practices. Likewise, the strengths and weaknesses of the university's current set-up were also determined, and challenges and issues that

affected the system were identified where recommendations to meet these challenges were forwarded.

An interview guide to elicit answers from key informants was used to validate the data generated from the survey questionnaire. Questions in the guide were based from the standardized survey instrument; probing and follow-up questions were also asked to clarify issues. Field notes were also maintained to capture the statements given out by the participants. Permission to conduct the study, as well as access to records was secured from the University President, the Director for Standards, the Campus Directors, and heads of units prior to actual study.

All personal information given by and elicited from the participants were kept confidential and only the necessary data for the purpose of the study were utilized.

Mean was the statistical tool used to describe the quantitative data. Each indicator per area was rated from the lowest 0 to the highest 10 and was based on the current status of the institution as per the OC-OECD Entrepreneurial Universities Framework. The scores given by the participants were combined to get the mean for every specific indicator and the mean per area. The grand mean would define the readiness of the university towards entrepreneurial transformation. The qualitative data consisting of responses gathered through KI interviews were used to validate the quantitative result. This would help in identifying the weak points of the university along the process and serve as basis in coming up with appropriate recommendations.

4. Findings and Discussion

The strengths and weaknesses of the state university towards its transformation to becoming an entrepreneurial university are presented based on the following areas:

A. Leadership and governance

Strengths. Results showed that the university has worked on its commitment and mission “to produce globally competent professionals, leaders and entrepreneurs” through its four-fold functions – instruction, research, extension and production. The university leadership has initiated to establish an institution-wide entrepreneurial program. It has designated a faculty in-charge of the income-generation projects, and a faculty whose function oversees the marketing activities of the institution. These designees have director titles and submit report to the monitoring and evaluation office.

Table 1*Entrepreneurial Status in terms of Leadership and Governance*

Indicator	Mean	Verbal Interpretation
Entrepreneurship is a major part of the university strategy.	4.2	Going Entrepreneurial
There is commitment at a high level to implementing the entrepreneurial strategy.	4.4	Going Entrepreneurial
The university has a model for coordinating and integrating entrepreneurial activities at all levels across the university.	3.4	Initially Going Entrepreneurial
The faculties and units have autonomy to act.	3.8	Going Entrepreneurial
The university is a driving force for entrepreneurship development in the wider regional, social and community development.	4.4	Going Entrepreneurial
	Area Mean	4.04
		Going Entrepreneurial

Legend: 10-Very Highly Advanced Entrepreneurial; 9-Very Highly Entrepreneurial; 8- Highly Entrepreneurial; 7-More Entrepreneurial; 6-Entrepreneurial; 5-Almost Entrepreneurial; 4-Going Entrepreneurial; 3-Initially Going Entrepreneurial; 2-Planning to Be Entrepreneurial; 1-Doing Non-Entrepreneurial Activities; 0-No Idea about Entrepreneurship

This implies that the top management of the university has a high spirit of commitment to implementing the plans and projects of the university, particularly in the area of entrepreneurship being part of its production function. Likewise, it has sent staff to actively participate in local, regional, and national development activities related to entrepreneurship as part of its human capability building as reflected by the mean of 4.4 described as Going Entrepreneurial. This action is congruent with the recommendation of the Erasmus+ Programme for Capacity Building in Higher Education (2017) for Philippine HEIs to embed entrepreneurship from leadership and in every part of the organization.

Weaknesses. The university, however, lacks a clear university entrepreneurial agenda which should have included specific objectives for entrepreneurship complete with performance indicators that are known across the institution and understood to be a priority program by its staff and students. The absence of such scheme to coordinate and integrate the activities of the different levels of the organization contributed to its mean of 3.4 interpreted as Initially Going Entrepreneurial. Thus, a distinct office for entrepreneurship with clearly defined functions different from the tasks pursued by the current directors for income-generation and marketing needs to be included in the university's organizational structure. This is understandable because the Erasmus+ Programme for Capacity Building in Higher Education (2017) found out in their assessment in the Philippines that the entrepreneurial agenda in the university level are new to some HEIs and that they are just starting to learn about it.

In fact, the commitment and motivation to implement entrepreneurship activity is still inadequate. Participants revealed that there is a felt need to overcome bureaucratic barriers to undertake entrepreneurial activities and speed up the idea of creation and decision-making. This is evident in the mean of 3.8 interpreted as Going Entrepreneurial. If so, this will make the creation of new entrepreneurial centers and structures for the development of new activities easy in the institution.

Overall, the entrepreneurial status of the university in terms of leadership and governance is Going Entrepreneurial. Obviously, this is logical as viewed by Velasco (2013) because entrepreneurship in the Philippines is basically a necessity entrepreneurship where Filipinos go into entrepreneurial ventures to meet their basic needs.

B. Organizational capacity: Funding, people and incentives

Table 2

Entrepreneurial Status in terms of Organizational Capacity, People and Incentives

Indicator	Mean	Verbal Interpretation
The university's entrepreneurial objectives are supported by a wide variety of funding sources/investment, including investment by external stakeholders.	3.8	Going Entrepreneurial
The university has a sustainable financial strategy in place to support entrepreneurial development.	3.8	Going Entrepreneurial
There are mechanisms in place for breaking down traditional boundaries and fostering new relationships – bringing internal stakeholders together (staff and students) and building synergies between them.	4.4	Going Entrepreneurial
The university is open to recruiting and engaging with individuals who have entrepreneurial attitudes, behaviour and experience.	4.4	Going Entrepreneurial
The university invests in staff development to support entrepreneurial agenda.	3.6	Going Entrepreneurial
There are clear incentives and rewards for staff who actively support the university's entrepreneurial agenda.	3.2	Initially Going Entrepreneurial
The university gives status and recognition to other stakeholders who contribute to the university's entrepreneurial agenda.	4.0	Going Entrepreneurial
Area Mean	3.89	Going Entrepreneurial

Legend: 10-Very Highly Advanced Entrepreneurial; 9-Very Highly Entrepreneurial; 8- Highly Entrepreneurial; 7-More Entrepreneurial; 6-Entrepreneurial; 5-Almost Entrepreneurial; 4-Going Entrepreneurial; 3-Initially Going Entrepreneurial; 2-Planning to Be Entrepreneurial; 1-Doing Non-Entrepreneurial Activities; 0-No Idea about Entrepreneurship

Strengths. The mean of 4.4 described as Going Entrepreneurial reflects that the university has institutionalized internal arrangements for sharing facilities across schools and colleges, student services, interdisciplinary units, allied teaching faculty and research groups. It also has put in place an approved institutional policy that allows open recruitment and engagement of qualified applicants which is expected considering that hiring and selection of staff is covered by Civil Service laws.

It also allows diversified IGPs to be run by personnel where income is used as revolving (self-funding) fund to improve the business. It has also started renting out spaces to small time stallholders to generate additional income. Likewise, these income generating projects serve as in-campus immersion and practice centers for students enrolled in related programs.

Cash incentives and teaching load equivalent credits are given to teaching personnel involved in these projects. Lately, the university has institutionalized the annual recognition of the different stakeholders who have contributed to the university's strategic agenda, thus the mean of 4.0 or Going Entrepreneurial proves its existence.

Weaknesses. It was observed, however, that the budget for entrepreneurial activities is wanting. Income-generating activities are limited and most of these IGPs are self-liquidating, thus income is inadequate to re-invest in other potential and diversified revenue-generating investments. Despite the availability of commercially-viable spaces, the institution is yet to pour in investment for entrepreneurial activities through a sustainable financial strategy. Investors have not got in, except for small stalls that come and go during class days. According to Hu (2009), funding support from public and private sources are important to assist in building entrepreneurial universities to reinforce the university-industry-government (UIG) linkages. The necessity of private funding support is to fill in the gap in technological development between universities and industries while those coming from the public as a catalyst in attracting private funding to bridge the gap between university and industry.

Despite the practice of sharing facilities, laboratories, and services across faculties, this is limited to instructional purposes. There is the absence of a mechanism for exploiting internal knowledge and resources for entrepreneurial activities. A formal organizational policy on selection, placement and development of personnel managing entrepreneurial activities to address the entrepreneurial agenda of the university needs to be prepared.

Conversely, a clear system for incentives and rewards for staff that actively support the university's entrepreneurial agenda is not in place, as reflected by the mean of 3.2 or Initially

Going Entrepreneurial. Incentives for the generation of income are based on a policy for production implemented since the two previous university administrations.

The same observation was recorded by Mudde, Fauzi and Widhiani (2017) in Bogor Agricultural University (IPB) in Indonesia. They found out that although the institutional leadership supported entrepreneurial activities, the faculty did not feel being incentivized for coaching and training students beyond lecturing or on developing new entrepreneurial courses. Also, limited attention was given to make the teaching and learning process more entrepreneurial and almost all entrepreneurship development activities were taken as extra-curricular.

C. Entrepreneurship development in teaching and learning

Table 3

Entrepreneurial Status in terms of Entrepreneurship Development in Teaching and Learning

Indicator	Mean	Verbal Interpretation
The university is structured in such a way that it stimulates and supports the development of entrepreneurial mindsets and skills.	3.6	Going Entrepreneurial
Staff takes an entrepreneurial approach to teaching in all departments, promoting diversity and innovation in teaching and learning.	2.8	Initially Going Entrepreneurial
Entrepreneurial behaviour is supported throughout the university experience; from creating awareness and stimulating ideas through to development and implementation.	3.6	Going Entrepreneurial
The university validates entrepreneurship learning outcomes.	2.6	Initially Going Entrepreneurial
Collaborating and engaging with external stakeholders is a key component of teaching and learning development in an Entrepreneurial University.	4.4	Going Entrepreneurial
Research results are integrated into entrepreneurship education and training.	5.4	Almost Entrepreneurial
	Area Mean 3.73	Going Entrepreneurial

Legend: 10-Very Highly Advanced Entrepreneurial; 9-Very Highly Entrepreneurial; 8- Highly Entrepreneurial; 7-More Entrepreneurial; 6-Entrepreneurial; 5-Almost Entrepreneurial; 4-Going Entrepreneurial; 3-Initially Going Entrepreneurial; 2-Planning to Be Entrepreneurial; 1-Doing Non-Entrepreneurial Activities; 0-No Idea about Entrepreneurship

Strengths. The university has established the School of Management Sciences (SMS) to be the delivering unit for students who would want to go into business and management related careers. It has offered a baccalaureate degree in entrepreneurship and it had required students to have start-ups for their final course requirement.

Food fairs, product exhibits, and skills competitions are conducted annually to showcase entrepreneurial abilities of students. Other curricular programs, like Food Technology, Home

Technology, Business Administration, and Hotel and Restaurant Management periodically expose students to simple economic activity where outputs of specific lessons are presented and offered for sale in the campus.

The university's strong linkages with stakeholders in business and industry have resulted to its graduating students' immersion in these establishments as part of their on-the-job training requirements as evidenced by the mean of 4.4 described as Going Entrepreneurial. This is consistent with the findings of the Erasmus+ Programme for Capacity Building in Higher Education (2017) which revealed that internships or practicum programs for students are very common across the HEIs in the Philippines.

Weaknesses. The university has not strengthened its academic entrepreneurship program to prepare graduates to be skilled entrepreneurs. As such, the delivery of instructional content and motivation towards entrepreneurial activities had not been emphasized and sustained.

Among the assessment result established by the Erasmus+ Programme for Capacity Building in Higher Education (2017) in the Philippines as pointed out by a number of respondents revealed that there is no internal funding provision for students to do research, and that only a number of these HEIs have incubation and acceleration programs that offer basic support services such as space provision and linkages to mentors and potential funders.

Since there is the absence of specific entrepreneurial service unit that carries out the supposed functions, the promotion of diversity and innovation in teaching and learning is not met, much more the learning outcomes validated as shown by the means of 2.8 and 2.6 or Initially Going Entrepreneurial, respectively.

Despite the existence of the offices of production and marketing, the functions of each unit are unclear. Delineation of roles and extent of services is not well-taken. Aside from this, the heads of these offices lack focus as they also hold academic responsibilities.

For a university that is starting to become one, this is likely because according to Chao (2018), an entrepreneurial university should be seen in terms of its ability to adapt and survive within an increasingly market environment, and in terms of its contribution to solutions to societal issues in their teaching, research and extension functions.

D. Pathways for entrepreneurship

Strengths. The administration through the different service units of the university has actively encouraged its personnel and students to develop entrepreneurial mindsets as shown by

the mean of 5.0 described as Almost Entrepreneurial. This is usually evident in in-service trainings conducted and extension activities done by the faculty in various adopted communities for their required extension functions.

Likewise, students are exposed to entrepreneurship-related forums and immersion activities that they have a feel of how entrepreneurs work and sustain the momentum of business.

Table 4
Entrepreneurial Status in terms of Pathways for Entrepreneurs

Indicator	Mean	Verbal Interpretation
The university raises awareness of the values/importance of developing entrepreneurial abilities amongst staff and students.	3.8	Going Entrepreneurial
The university actively encourages individuals to become entrepreneurial.	5.0	Almost Entrepreneurial
The university provides opportunities to experience entrepreneurship.	4.0	Going Entrepreneurial
The university provides support for individuals and groups to move from entrepreneurial ideas to action.	3.4	Initially Going Entrepreneurial
Mentoring by academic and industry personnel is available.	3.2	Initially Going Entrepreneurial
The university facilitates access to private financing for its potential entrepreneurs.	3.0	Initially Going Entrepreneurial
The university provides access to business incubation facilities.	2.8	Initially Going Entrepreneurial
	Area Mean 3.6	Going Entrepreneurial

Legend: 10-Very Highly Advanced Entrepreneurial; 9-Very Highly Entrepreneurial; 8- Highly Entrepreneurial; 7-More Entrepreneurial; 6-Entrepreneurial; 5-Almost Entrepreneurial; 4-Going Entrepreneurial; 3-Initially Going Entrepreneurial; 2-Planning to Be Entrepreneurial; 1-Doing Non-Entrepreneurial Activities; 0-No Idea about Entrepreneurship

Weaknesses. Low awareness on value of entrepreneurship and entrepreneurial engagement is observed as the mindset in the university is highly academic. Thus, more information dissemination and orientation on entrepreneurial plans and programs of the university is needed, particularly among the personnel of the university. Seminars and trainings in coming up and establishing start-ups and spin-offs and funding support for such are yet to be considered. In contrast, students, teaching staff and stakeholders in an Indonesian university are aware of and had positive perception of the entrepreneurial status of the organization even if these perceptions were significantly different when compared with each group (Mudde et al., 2017).

Noticeably, the staffs assigned in IGPs are contractual. There is also the absence of entrepreneurial skills enhancement programs for these workers.

A plan to network with private financiers by the university for its potential entrepreneurs is not yet on the drawing table. Provision for on-site incubators remains a need. This is where the university needs to prioritize because according to Prokopowicz (2019), academic incubators are developed at universities to support innovation and entrepreneurship of students. They supplement to the educational program to activate the innovation and entrepreneurship of students. These can even be the link to the industries and companies that may take in internship of students, employ business graduates of the institution, and help in securing financial support from banks and other financial institutions.

E. University – business/external relationship for knowledge exchange

Table 5

Entrepreneurial Status in terms of University – Business/External Relationships for Knowledge Exchange

Indicator	Mean	Verbal Interpretation
The university is committed to collaboration and knowledge exchange with industry, society and the public sector.	5.8	Entrepreneurial
The university demonstrates active involvement in partnerships and relationships with a wide range of stakeholders.	4.8	Almost Entrepreneurial
The university has strong links with incubators, science parks and other external initiatives, creating opportunities for dynamic knowledge exchange.	2.8	Initially Going Entrepreneurial
The university provides opportunities for staff and students to take part in entrepreneurial activities with businesses/the external environment.	4.4	Going Entrepreneurial
The university specifically supports staff and student mobility between academia and the external environment.	4.8	Almost Entrepreneurial
The university links research, education and industry (wider community) activities together to affect the whole knowledge ecosystem.	5.2	Almost Entrepreneurial
	Area Mean 4.63	Almost Entrepreneurial

Legend: 10-Very Highly Advanced Entrepreneurial; 9-Very Highly Entrepreneurial; 8- Highly Entrepreneurial; 7-More Entrepreneurial; 6-Entrepreneurial; 5-Almost Entrepreneurial; 4-Going Entrepreneurial; 3-Initially Going Entrepreneurial; 2-Planning to Be Entrepreneurial; 1-Doing Non-Entrepreneurial Activities; 0-No Idea about Entrepreneurship

Strengths. The university has a good working collaboration and exchange knowledge with industry, society and the public sector. It has created a good name in the community that access to external facilities for its personnel and students had been smooth and functional. It has, for years linked with the industry, particularly in sending its graduating students for their off-campus internship, on-the-job training and practicum. The faculty has likewise enjoyed scholarship opportunities and research funding support due to the strong relations of the university with these

establishments and organizations as proven by the mean of 5.8 described as Entrepreneurial. This result is aligned with the concept of Genc and his group (2020) who said that it is essential for HEIs to find creative ways to encourage and develop strong university-industry collaboration (UIC) to stimulate the establishment of startups for technocities or technoparks for internship programs of students.

It has absorbed back into the university's environment the knowledge created and co-created by research, industry, education and the wider community, as shown by the mean of 5.2 or Almost Entrepreneurial. Thus, it welcomed guest lecturers from the stakeholders or experts from the industry, and collaborated with established organizations for research partnerships.

The university has also gained the respect of local government units as it has helped transform communities in its extension programs and projects.

And, it has supported faculty and student mobility as it allowed faculty members to fellowships, and students to internships abroad as evidenced by the mean of 4.8 described as Almost Entrepreneurial.

Weaknesses. The university has not had linked with incubators, and science and business parks nor has it had a mechanism in place to capitalize on knowledge acquired as there is no local concept about this, as shown by the mean of 2.8, described as Initially Getting Entrepreneurial. The possibility of coming up with a technology or business hub is farfetched. Likewise, the opportunity of giving the organization's personnel and staff and students to take part in entrepreneurial activities with businesses and the external environment is from weak to nil.

F. The Entrepreneurial University as an internationalized institution

Strengths. The Office of International Relations was put up in February 2018 to plan, prepare, and implement programs and projects related to the internationalization of personnel and student activities, particularly on faculty and student exchange, professional and educational collaboration, joint research undertakings, exchange of publications, socio-cultural development and other activities that may bring about beneficial returns to the university. Thus, cultural visits, faculty lecture forums between partner institutions, and student internship abroad were accomplished.

The faculty and students have participated in international events as paper presenters in conferences, and participants in seminars and trainings as proven by the mean of 4.8 or Almost Entrepreneurial.

The university has been a recipient of overseas volunteers and student services, and has sent fellows to international executive programs as shown by the mean of 4.8 or Almost Entrepreneurial.

Table 6

Entrepreneurial Status in terms of the Entrepreneurial University as an International Institution

Indicator	Mean	Verbal Interpretation
Internationalization is a key part of the university's entrepreneurial strategy.	4.4	Going Entrepreneurial
The university explicitly supports the international mobility of its staff and students (including PhD students).	4.8	Almost Entrepreneurial
The university seeks and attracts international and entrepreneurial staff (including teaching, research and PhDs).	4.2	Going Entrepreneurial
The university demonstrates internationalization in its approach to teaching.	4.6	Almost Entrepreneurial
The university, its departments and faculties actively participate in international networks.	4.8	Almost Entrepreneurial
	Area Mean	4.56
		Almost Entrepreneurial

Legend: 10-Very Highly Advanced Entrepreneurial; 9-Very Highly Entrepreneurial; 8- Highly Entrepreneurial; 7-More Entrepreneurial; 6-Entrepreneurial; 5-Almost Entrepreneurial; 4-Going Entrepreneurial; 3-Initially Going Entrepreneurial; 2-Planning to Be Entrepreneurial; 1-Doing Non-Entrepreneurial Activities; 0-No Idea about Entrepreneurship

Weaknesses. There is a very limited budget to fund the university needs for the international mobility of its faculty and students, and the mechanism in the recruitment and hiring of international faculty and staff is also wanting in the university. Likewise, the necessity of embedding in the teaching and learning content the promotion of internationalization is among the priority. In his observation, Alghamdi (2020) found out that academic leaders in Saudi universities also perceived that entrepreneurship in their institutions were in a moderate level. Among the dimensions in moderate level included University-Business/External Relationships for Knowledge Exchange, The Entrepreneurial University as an Internationalized Institution, Entrepreneurship Development in Teaching and Learning, and Measuring Impact of the Entrepreneurial University.

G. Measuring the impact of the Entrepreneurial University

Strengths. The university has a mechanism to monitor the income-generating activities of the different campuses. Regular reporting schemes are adhered upon by projects-in-charge, and the systems income is reported to the governing board during its periodic meetings.

Weaknesses. A scheme to monitor the entrepreneurial activities of the university is yet to be drafted as shown by the mean of 2.6 described as Initially Going Entrepreneurial. Knowledge exchange related activities, as scholarships and fellowships given to faculty and students, and scholarly products crafted and produced by the personnel are not strictly monitored, thus its impact on the program of the university cannot be ascertained as evidenced by the mean of 2.8 or Initially Getting Entrepreneurial.

Table 7

Entrepreneurial Status in terms of Measuring the Impact of the Entrepreneurial University

Indicator	Mean	Verbal Interpretation
The university assesses the impact of its entrepreneurial strategy and the strategy is responsive to change.	3.4	Initially Going Entrepreneurial
The university assesses the level of engagement in entrepreneurial teaching and learning across the institution.	3.2	Initially Going Entrepreneurial
The university regularly assesses the impact of entrepreneurship teaching and learning.	2.8	Initially Going Entrepreneurial
The university carries out regular monitoring and evaluation of the universities' knowledge exchange activities.	3.2	Initially Going Entrepreneurial
The university carries out regular monitoring and evaluation of the impact of start-up support.	2.6	Initially Going Entrepreneurial
Area Mean	3.04	Initially Going Entrepreneurial

Legend: 10-Very Highly Advanced Entrepreneurial; 9-Very Highly Entrepreneurial; 8- Highly Entrepreneurial; 7-More Entrepreneurial; 6-Entrepreneurial; 5-Almost Entrepreneurial; 4-Going Entrepreneurial; 3-Initially Going Entrepreneurial; 2-Planning to Be Entrepreneurial; 1-Doing Non-Entrepreneurial Activities; 0-No Idea about Entrepreneurship

This situation was also observed in an HEI in Indonesia. University-business relations were limited and that business partners (if there were), were hardly responsible in the knowledge generation process. What dominated the mindset of IPB officials was not on knowledge generation or co-creation but on knowledge transfer. Thus, the focus was more on how much is transferred and not on how many were used and applied (Mudde et al., 2017).

Summary. As a whole, this Philippine state university in Aklan today is Going Entrepreneurial as evidenced by the mean of 3.93. But its business and/or external relationships with industries and stakeholders and becoming an internationalized institution is Almost Entrepreneurial as shown by the means of 4.63 and 4.53, respectively.

In all other areas of qualification towards becoming an entrepreneurial university, except one, as leadership and governance; organizational capacity, people and incentives; entrepreneurship development in teaching and learning; and pathways for entrepreneurs, this state university is Going Entrepreneurial. It is only in measuring the impact of entrepreneurial university that the state university is Initially Going Entrepreneurial as shown by the mean of 3.04.

Table 8

Overall Entrepreneurial Status of the Institution based on the Guiding Framework for Entrepreneurial Universities

Indicator	Mean	Verbal Interpretation
Leadership and governance	4.04	Going Entrepreneurial
Organizational capacity, people and incentives	3.89	Going Entrepreneurial
Entrepreneurship development in teaching and learning	3.73	Going Entrepreneurial
Pathways for entrepreneurs	3.60	Going Entrepreneurial
University – business/external relationships for knowledge exchange	4.63	Almost Entrepreneurial
The Entrepreneurial University as an internationalized institution	4.56	Almost Entrepreneurial
Measuring the impact of the Entrepreneurial University	3.04	Initially Going Entrepreneurial
Grand Mean	3.93	Going Entrepreneurial

Legend: 10-Very Highly Advanced Entrepreneurial; 9-Very Highly Entrepreneurial; 8- Highly Entrepreneurial; 7-More Entrepreneurial; 6-Entrepreneurial; 5-Almost Entrepreneurial; 4-Going Entrepreneurial; 3-Initially Going Entrepreneurial; 2-Planning to Be Entrepreneurial; 1-Doing Non-Entrepreneurial Activities; 0-No Idea about Entrepreneurship

Challenges and Issues for the Internal System

As the state university works towards its transformation from a purely academic institution to an entrepreneurial university, challenges and issues affect its internal system. Participants agree that the university is located strategically where there is: 1) political leadership openness to support development plans and projects; 2) presence of internationally-popular eco-tourism, farm tourism, cultural and heritage tourism potentials; 3) booming business atmosphere in the province and the region; 4) availability of local and international scholarships and fellowships for staff and students; 5) presence of commercial banks offering loan credits; and 6) presence of private colleges and learning centers.

It may also be imperative for this state university to consider the recommendations forwarded by the Erasmus+ Programme for Capacity Building in Higher Education (2017) like the creation of opportunities to build more partnerships with investors, establishment of partnerships, addressing of the need for guidance on engaging in new business models, and strengthening of industry engagement to craft relevant programs and opportunities for students.

5. Conclusion

The state university is on its way to getting entrepreneurial. Activities are reflective and indicative of characteristics an entrepreneurial university should have. Basically, the university has in its mission "... to produce globally competent ... entrepreneurs..."; however, it has an undefined entrepreneurial agenda, policy and system to follow.

Specific budget to support IGPs is just enough to keep the project going. Recognition and incentive scheme need to be revisited to clear issues. The staffing pattern and stated tasks for entrepreneurial activities in the university is wanting. The university has established good relationships with external stakeholders. However, it just started initiating moves for internationalization of its plans, activities and programs.

Thus, enhancement and enrichment programs can be included in the next revisit and review of the existing and soon ending strategic plan. These may include appropriation of budget to support the entrepreneurial projects or start-ups by the faculty, staff and students, inclusion in the administrative manual the pattern, and functions of the staff engaged in entrepreneurial activities, and exploration of functional engagements and linkages with external (local and international) stakeholders and willing business partners, experts and entities who could help put up or invest on incubators, science parks and the like.

The weaknesses will be a challenge to the new administration to consider as it engages on crafting the new strategic plan for the institution.

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Model for Web-based Learning Module in Senior High School General Chemistry

Ritchelle W. Origenes

Abstract

The CoViD-19 pandemic has brought challenges in the learning continuity of school children. New normal learning amidst the current pandemic demands the use of technology and the internet. This study aimed to determine if the web-based learning modules (WLM) have significant effects on the performance of the students in Senior High School (SHS) General Chemistry 1. Before utilizing the WLM, the students got lower actual mean of 23.66 in the pretest which was 6.34 lower than the hypothetical mean. Results further revealed that the students who used WLM got an actual mean of 48.42 in the post-test which was 18.42 higher than the hypothetical mean. Moreover, the students in the WLM acquired a mean gain of 24.75 with a standard deviation of 4.21. The study found a significant mean gain between the pretest and posttest performance of the Grade 11 students in General Chemistry 1 using the WLM. The results affirmed a great improvement in the performance of the students from the pretest to the posttest. The results imply the use of WLM as a great supplemental learning tool that allows learners to go through the material at their own pace exploring the contents of the modules. Thus, the model for the module development can be used in the teaching and learning across the grade level curriculum.

Keywords: *new normal learning, web-based learning materials, flipped classroom*

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1. Introduction

It is undeniably true that today instruction using the computer is widely used and accepted by the students, but its effectiveness in helping the school learners is still questionable. The traditional classroom pedagogies are put into question with the advent of technology (Guarino et al., 2014). As educators, it is very important to adopt the unceasing revolution in the use of technology in the classroom. It is imperative for educators to prove that the use of technology in the classroom results in sufficient or exceeding student success (Bailey et al., 2001; Johnson et al., 2016). In addition, it is a necessity to identify the learners' behaviors and attitudes that promote quality learning in the technologically-based community so that educators can give differentiated instruction to school learners (Bailey et al., 2001; Nelson, 2017).

The availability of online and offline educational materials and the accessibility of technology and internet connectivity in classrooms have changed educators' attentions to online learning and computer-assisted instruction (Anglin & Morrison, 2000; Apuke & Iyendo, 2018). With the capacity to access offline, online, and interactive educational materials from the internet and web-based connection, lawmakers, parents, and educators are considering the internet as an effective and efficient method of leveling the teaching and learning process in the classroom (Francek, 2000; Apuke & Iyendo, 2018), and providing the conducive learning environment for each 21st-century learner (Roth, 1999; Svetcov, 2000; Ng, 2021). Moreover, online learning materials and strategies, like game-based learning, mobile learning, online courses, and blended learning, are the latest inclusion in the higher-education resources. These have the strong grip of expanding, enhancing, and strengthening learning for school learners.

Traditional and online learning create an impression on their exciting attributes and evolving functions that may or may not have effects on student achievement. Some promoters for online learning assert that technology-assisted learning is superior to traditional teaching-learning methods (Milliron, 2010). However, Angiello (2010) believes that the bottom line between the issues of online and traditional learning is that educators should understand the effectiveness of online learning before scarce resources are spent. This idea is congruent with a study conducted by Means et al. (2009), which concluded that students who took part in their classes online pulled off better than students in the usual face-to-face instruction. According to Bork (2014), the computer is meant to be a meaningful factor in learning at all levels with all types of school

learners. Primarily, the main factor is involvement and interaction. The computer can create learning an active method, as contrast to a passive method, that signifies meaningful results.

According to Deloatch (2015), technology changes the way children (who are the learners) think and feel. School children who are always engaged in the use of search engines may be good at looking for information—but not at remembering it. Moreover, schoolchildren who utilize technology do not have the chances or opportunities to be creative and imaginative or to be critical thinkers. It is also observed that the number of hours that adolescents spend using technology is increasing. They always take part in socialization and interaction. A greater concentration signifies the adolescents' involvement in activities on social networking sites. The adolescents who are also school children enjoy interacting with others on social networking sites and they may not anymore be doing the tasks they are supposed to do like studying (Roois et al., 2011). A high level of involvement in social networking sites makes school learners lose focus on school curricular activities and affects their academic performances (Simuforosa, 2013).

The computer is vastly used in education, either training or adult and formal education. However, integrating technology in education in the Philippines has produced misconceptions. Technology literacy is only meant for the ability to use basic office tools. This intensely demands the procurement of computer hardware and software. This situation does not only require a big cost in education but creates also issues on accessibility and availability. The technology in the school is also utilized only for communication, grading, enrolment, and accounting (Matulac, 2013).

The rapid expansion of the Internet and the diverse capabilities of computer software and hardware are influencing the dynamics of teaching and learning on many different levels (Wasim et al., 2014). Online learning, which is often called web-based learning, has been widely used in many schools globally. The proliferation of web-based learning has sparked numerous studies exploring and determining different variables that may influence the learning experience among learners (Kim & Moore, 2005). However, the study of Zahroh (2020) showed that web-based module did not have a significant positive impact on student learning outcomes. Dinc (2017) argued that a well-designed educational website help learners enhance their online learning experience through interactive designs. For a successful web-based learning experience, Schrum and Hong (2002) identified several student factors such as technology experience, access to tools, learning styles, study skills and habits and skills, student's goals, lifestyle factors and student's

personal traits. Unlike the classroom environment, web-based learning is much easier to design and implement the instruction according to the learners' preferences. Integrating various media elements such as, text, sound, video and dynamic illustrations can foster the elaboration of complex subject matters (Mustafa, 2005). According to Chiriac (2019), the design of the web-based learning is highly influenced by organizational, technological, pedagogical, and contextual approaches.

The threat of the pandemic changes a lot in the Philippine educational system (Castroverde & Acala, 2021). This pandemic may result in the longer-term adoption of the new normal in which the students and teachers face the burden of sustaining and continuing the teaching and learning process (Cortezano et al., 2021). The emergence of new normal learning amidst the current pandemic demands the use of technology and the internet (Obana, 2020). The Department of Education (DepEd) has already mandated the use of distance learning modalities such as online synchronous and asynchronous learning and digital and printed self-learning modules.

The current situation of the Philippines is true to the schools of Cebu City. Since face-to-face learning is impossible for most schools, the Department of Education (DepEd) issued the DepEd Order Number 12, s. 2020 on the "Adoption of the Basic Education Learning Continuity Plan (BE-LCP) for School Year 2020-2021 in Light of the COVID-19 Public Health Emergency". This reiterates the learning delivery modalities that schools can adopt depending on the COVID-19 restrictions and the particular context of the learners in the school or locality. Distance learning is the common learning delivery modality that a school can adopt due to numerous travel, gathering and health restrictions imposed by the government. Distance learning refers to a learning delivery modality where learning takes place between the teacher and the learners who are geographically remote from each other during instruction. This modality has three types: Modular Distance Learning (MDL), Online Distance Learning (ODL), and TV/Radio-Based Instruction. The MDL involves individualized instruction that allows learners to use self-learning modules (SLMs) in print or digital format, whichever is applicable in the context of the learner, and other learning resources like learner's materials, textbooks, activity sheets, study guides, and other study materials. Meanwhile, ODL features the teacher as facilitator, engaging learners' active participation through the use of various technologies accessed through the internet while they are geographically remote from each other during instruction. TV/Radio-Based Instruction utilizes SLMs converted to video lessons for Television-Based Instruction and SLMs converted to radio scripts for Radio-Based Instruction. The most commonly used modality in the public school

system is the MDL due to its simplicity and ease of reproduction however students' performance dropped (Dargo & Dimas, 2021). Thus, this study considered the use of ODL.

Although there are already digital self-learning modules in Chemistry, no available web-based self-learning modules are interactive and advanced to improve learning experience. The implementation of web-based learning makes the instruction process faster and more accessible and upgrades teachers' methods and strategies in teaching and enhances students' learning performance (Ayuyang, 2019). Similarly, Khalifa and Lam (2002) found that web-learning environments have made learning much more convenient and provided the learner with more exploration and interactivity capabilities. In fact, in the study of Chen et al. (2010) found a general positive relationship between the use of the learning technology and student engagement and learning outcomes. In chemistry classes, the web-based learning environment has the potential to enhance the comprehension of chemistry concepts (Cahyana & Supatmi, 2019), students' attitudes and interests, and to increase students' awareness regarding the relevant aspects of chemistry to daily life (Frailich et al., 2007).

This study develops a model for the web-based learning module (WLM) on senior high school general chemistry based on the calculated effects of the WLM on the performance of the students through the pretest and posttest. The study tested the following hypotheses:

HO1: There is no significant difference between the hypothetical mean and the actual mean of the pretest and posttest performance of the students in Grade 11 General Chemistry 1 using the WLM.

HO2: There is no significant mean gain from the pretest and posttest of the students' performance in General Chemistry 1 using the WLM.

2. Methodology

Research Design

This study was conducted based on an experimental method of research utilizing one group pretest-posttest design where one group of Grade 11 STEM students was exposed to web-based learning modules and paper-based learning modules. The research design was diagrammed as follows:

RG₁ O₁ X₁ O₂

where:

RG₁ - randomized group exposed to WBLM,

O₁ - pretests,

O₂ - post-tests

X₁ - WBLM Technique

Participants

The participants of the study were 32 senior high school students at Mabolo National High School, one of the biggest schools in the city. The school is under the K to 12 Basic Education Curriculum of the Department of Education, Division of Cebu City. These participants were Grade 11 students under the Science, Technology, Engineering and Mathematics (STEM) strand of the academic track of DepEd Senior High School curriculum. There was only 1 section of the STEM class with a total of 38 students. The study used complete enumeration but six students were dropped from the participants due to their absence and disengagement. The participants consisted of 12 boys and 20 girls whose ages were between 16 – 19 years old.

Instrument

In order to measure the effects of the web-based modules on the academic performance of the students, this study utilized a 50-item test in Grade 11 General Chemistry 1. The test was based on the DepEd Teacher's Manual. The contents of the pretest and post-test were the same with disparity on the sequence of the questions.

For the content validity of the test, the study followed the suggested modules provided by the DepEd and consulted different experts on General Chemistry for suggestions. The corrections and refinement of the research instrument was done after the feedback.

Data Gathering Process

The data gathering process involves several stages for the 8-week experimental period.

Development of Web-based Modules. This research utilized modules provided by DepEd Cebu City Division and other available references. A variety of available online simulations,

videos, and interactive quizzes were utilized and linked to Google Forms carefully. The created Google Form, which has contents similar to that of the modules provided by DepEd, served as the web-based learning modules. The development of WLM was based on the most essential learning competencies (MELCs) in General Chemistry 1 issued by the Department of Education. There were eight WLMs developed for General Chemistry 1 before the opening of the first day of classes for the School Year 2020 – 2021.

Implementation of the Pretest. Prior to data gathering and implementation of the pretest, a letter was sent to the School Head for approval to conduct the research. Upon the approval of the request, the experiment was conducted. The experimental period took effect on the first day of the first grading period of the School Year 2020 – 2021. The pretest was conducted on the first day of the class. The pretest was based on the General Chemistry 1 MELCs. The questions were encoded in Google Forms and the link was sent to the students. The students accessed and took the pretest by clicking the given link.

Utilization of the Web-based Modules. The students were given web links in order to access the WLM. With the students using WLM, the teacher acted as a facilitator who only assisted the students in the process of learning like answering questions regarding the web-based learning module's content and functionality via online and face-to-face communication. The process of learning in this method was the sole responsibility of the students. They actively studied the contents of the modules and validated their learning by answering the provided exercises and looking into other online references and discussions. With the use of WBLM, the process of students' learning was assessed by individuals and by groups depending on the level of difficulties of the subject matter. The students used the WLM for two months. The students used the eight WLMs to achieve the General Chemistry 1 MELCs. These eight WLMs have activities that students need to answer. The students needed to access and answer one WLM every week.

Implementation of the Posttest. After eight weeks of utilizing WLM, the students took the posttest. The posttest was also based on the General Chemistry 1 MELCs. The questions were encoded in Google Forms and the link was sent to the students. The students accessed and took the posttest by clicking the given link.

Data Analysis

The following statistical treatments were utilized: z-test for single and large sample and t-test.

3. Results and Discussion

Table 1

Pretest Performance of the Grade 11 Students in General Chemistry I

Group	N	H. M. ^a	A. M.	SD	Test Statistics		Qualitative Description
					Computed z-test	Tabled Value	
WLM	32	30	23.66	2.97	12.08*	1.96	Below Average

**Significant at $\alpha = .05$, $z \geq 1.96$. ^aHypothetical Mean was based on the 60% of the test items which is equivalent to 75% standard criterion DepEd*

Table 1 exhibits the hypothetical mean and the actual mean of the performance of the Grade 11 students in General Chemistry 1 before they were given and exposed to WLM. Based on the results, the students under WBLM got an actual mean of 23.66 which was 6.34 lower than the hypothetical mean. The computed z-test of 12.08 at $\alpha = .05$ was greater than the tabled value of 1.96. This was significant, thus H_{01} was rejected. This meant that there was a significant difference between the hypothetical mean and actual means of the students. The students' performance before the conduct of the experiment was 'Below Average'. The students' performance before they were given and exposed to WBLM did not reach the standard performance of 60%. The below-average performance of the Grade 11 students in General Chemistry 1 implied that the students had little or no knowledge on the subject matter at all since this was still a pretest. The students did not master the pre-requisites or learn Chemistry in the lower grade levels. This finding supports Sudha and Amutha (2015) that the students in the Chemistry class usually have poor performance in the pre-test. The result is also similar to the studies of Sirhan (2007), Childs and Sheehan (2009), and Johnstone (2000) that Chemistry is mostly regarded as a difficult course or subject for students.

Table 2*Posttest Performance of the Grade 11 Students in General Chemistry 1*

Group	N	H. M. ^a	A. M.	SD	Test Statistics		Qualitative Description
					Computed z-test	Tabled Value	
WLM	32	30	48.42	2.01	51.81*	1.96	Above Average

*Significant at $\alpha = .05$

Table 2 provides the hypothetical and the actual means of the performance of the Grade 11 students in General Chemistry 1 in WLM. Results revealed that the students who used the WBLM got an actual mean of 48.42 which was 18.42 higher than the hypothetical mean. The computed z-test of 51.81 was greater than the tabled value of 1.96 at $\alpha = .05$ for the WLM. Thus, H_{01} was rejected. This indicated that there was a significant difference between the hypothetical mean and actual means of the students. The performance of the students after the implementation of the WLM was 'Above Average'. The Grade 11 Students in General Chemistry 1 surpassed the standard performance of 60%. The above-average performance was attributed to the fact that the new strategy was effective and helpful to the students' fast comprehension and easy absorption of the concepts of the lesson. The posttest performance of the students supported the studies conducted by Bailey et al. (2001), Huang (2014), and Rich and Guy (2013) which showed above average students' performance in the post-test. During the pandemic period, Rachmadtullah et al. (2020) and Sefriani et al. (2021) used the same technique and affirmed the improvement of the performance of the students from pretest to posttest. This finding encourages students to integrate WLM as advanced technology for every lesson so that they can become creative and active in improving knowledge and skills (Ali et al., 2019).

Table 3*Mean Gains in the Pre and Posttests Obtained by the Grade 11 Students in General Chemistry 1*

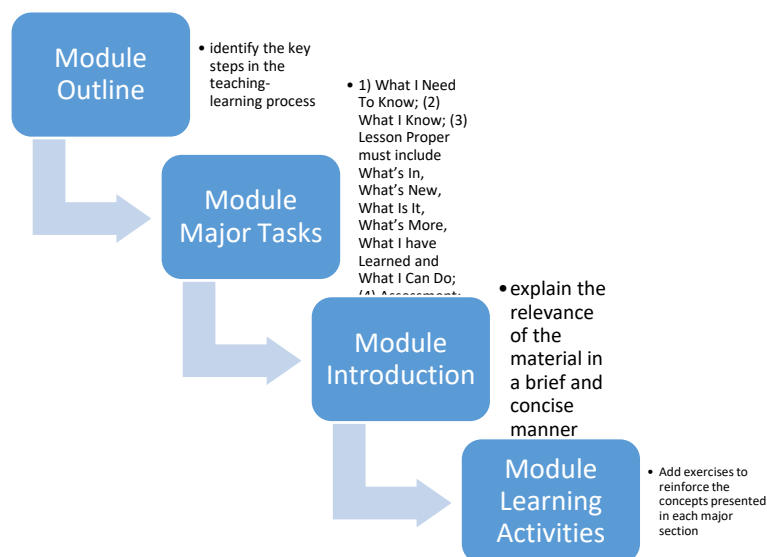
Group	N	Pretest Mean	Posttest Mean	\bar{d}	S_d	Test Statistics	
						Computed t-tests	Tabled value of t at $\alpha = .05$ with (n-1) df
WLM	32	23.66	48.42	24.75	4.21	33.74*	2.04

*Significant

Table 3 contains the results of the computation of the pretest and post-tests means, mean gains, standard deviations and the computed t-tests in Chemistry. The students in the WLM acquired a mean gain of 24.75 with a standard deviation of 4.21. The computed t-tests of 33.74 was greater than the tabled value at a 5% level of significance. This rejected H_{02} on the significant mean gain between the pretest and posttest performance of the Grade 11 students in General Chemistry 1 using the WLM. This meant that there was a great improvement in the performance of the students from the pretest to the posttest. The findings of this study affirmed Caine and Caine (1990) on their theories that the learners learn best when they are active engager of the activity and build their knowledge through experiences that enable them to create schemas mental models in their heads. Similarly, Ayuyang (2019) explained that the learners can improve their performance in the subject because of their interaction with the contents of the web-based learning environment. As to the WLM, Rachmadtullah et al. (2020) assert that this kind of learning offers almost all facilities with the delivered comfort of a learning experience tailored fit for the learners' schedule. Moreover, the findings of this study also confirmed Knowles (1975) who theorized that self-directed learners control their own learning processes while the instructor simply helps the learner by providing a rich environment from which the learner can learn best and the experiences of each learner come from within each individual learner. Thus, this leaves each learner motivated to solving of each problem related to the topics or concepts of the subject matter.

Figure 1

Conceptual Model of Designing a Web-based Learning Module



The WLM is a great supplemental learning tool. It allows the learners to go through the material at their own pace navigating through the pages of the module. It also helps maintain attention due to the interaction with the learner and the module itself. The learner can return to the module after going through it and navigate through the module to review past information whenever they desire. The module contains a test to measure how much the user has learned after going through the module and help point out the important parts of the module depending on how it is set up.

The use of web-based learning modules in teaching General Chemistry 1 produced the above-average performance of the students in the subject and promoted a more positive attitude of students. Hence, the guidelines are formulated as the model for a WLM.

Outline the session. The most important element in an effective web-based learning module is the way in which it is organized. The learners need to know the prospective major tasks in the lesson at hand. This helps learners recognize and remember the most important elements in the process. Use the outline to identify the key steps in the teaching-learning process. Aim for five to eight sections per module, including the introduction and summary sections.

Create sections for major steps in the process. Design the learning module so that each major task is its own section. In developing a web-based learning module using Google Forms, for example, the main sections might be (1) What I Need To Know; (2) What I Know; (3) Lesson Proper must include What's In, What's New, What Is It, What's More, What I Have Learned and What I Can Do; (4) Assessment; (5) Additional Activities; and (6) References.

Create brief and concise introductions. The introduction of the learning module sets the stage for everything that follows. In creating an introduction of the module, it is a must to establish the what's, how's, and the why's for the students. There is a must to explain the relevance of the material in a brief and concise manner so that the learners will understand the relevance of the web-based modules to their learning. There is a must to state the objectives, and cite the activities of the modules clearly so the learners will anticipate what they will learn in the course.

Reinforce the learning in each section with exercises. One of the great advantages of working in a self-directed, online learning environment is that students can accomplish exercises during the course to assess their own learning and determine what they need to review. Add exercises to reinforce the concepts presented in each major section. With these exercises, students

evaluate different scenarios and apply what they have learned. Other exercises include multiple-choice, sorting, or interactive activities which are expedient in student learning.

4. Conclusion

This study developed a model for the web-based learning module (WLM) on senior high school general chemistry based on the calculated effects of the WLM on the performance of the students through the pretest and posttest. This study was conducted based on an experimental method of research utilizing one group pretest-posttest design where one group of 32 Grade 11 STEM students was exposed to web-based learning modules.

Before utilizing the WLM, the students got an actual mean of 23.66 in the pretest which was 6.34 lower than the hypothetical mean. Results in this study revealed further that the students who used the WLM got an actual mean of 48.42 in the post-test which was 18.42 higher than the hypothetical mean. Moreover, the students in the WLM acquired a mean gain of 24.75 with a standard deviation of 4.21 which means there is an improvement in their academic performance from pretest to post-test.

As the WLM produced better performance and developed a more positive attitude towards the subject, the study recommends the use of the WBLM in science subjects and in other discipline. It can also be used as an alternative approach in the Alternative Learning System and Alternative Delivery Mode of Instruction. Since this research was limited to Mabolo National High School, further studies can expand the research environment and respondents and may consider web-based learning modules in teaching subjects like Araling Panlipunan, English, Filipino and Mathematics, and other branches of science like Physics, and Biology.

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Senior High School Students' Awareness and Literacy on Computer Software Applications

Jorlan C. Indrinal

Abstract

The digital revolution has had a significant impact on daily life, as shown by the widespread use of devices and the seamless incorporation of technology into everyday activities. The purpose of this research paper is to find out the weak points of students in the awareness and usage of essential software applications as the fundamental inputs to the Program Enhancement for Senior High School (SHS) Technical-Vocational-Livelihood – Information Communication and Technology (TVL-ICT) students at Lopez National Comprehensive High School. The study utilized descriptive method of research conducted at Lopez, Quezon. A purposive sampling method was used in selecting the sample size constituting 36 student-respondents in different age and year levels. The study used Google forms and the survey was conducted via the internet due to the pandemic. The findings of the study showed that the Grade 11 and 12 students are aware of ICT fundamentals and different computer software applications. It was further revealed that there was significant difference in the computer software application awareness between grade 11 and grade 12 students. In order to improve students' knowledge and literacy in database applications, webpage design, and basic computer programming, an enhancement program may be applied to the specialization or integrated into other ICT subjects.

Keywords: *TVL-ICT, LNCHS, Computer Awareness SHS, ICT Literacy*

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1. Introduction

The world has become increasingly reliant on technology. In fact, it changed the way people think about and value stuff, especially in the field of education. In this era of information technology, teachers, parents, and students are all becoming more aware of their importance in the search for knowledge. It makes the teacher's job easier while maintaining a positive attitude. The teachers are integrating their instruction through technology while the students have easy access on the internet to find information related to their studies. The age of information and communication technology (ICT) has begun that people without the knowledge will be left behind (Hwa, 2015).

In the Philippines, ICT is a watershed moment in the educational system. The rapid advancement of ICT paved the way for numerous opportunities in education, jobs, and personal lives. During the pandemic that the distance learning has been introduced, the teaching and learning mostly took place online. In this regard, both the teachers and students need to at least have a background on the proper use of technology in teaching and learning. While the ICT provides a wide range of possibilities for both teachers and students, it also necessitates development of skills (DICT, 2010).

Although people may benefit from ICT in a variety of ways, including data and analysis, it is still a pipe dream for many. For instance, the underprivileged school children in the Philippines have no access to computer and the internet. The introduction of module approach to teaching and learning in the public school system benefits the students with no access to technology (Vidal, 2017). While majority of the students use their mobile phones in online learning, there are students with no access to technology at all.

Developing and maintaining technical skills and competencies is seen as a critical part of a student's ability to engage with twenty-first century education by governments all over the world. In Quezon Province, public schools lack full ICT facilities while the majority of teachers are not ICT literate, making it difficult for students to learn (Gacia-Ordaz, 2015). As a consequence, student and school performance suffers. With the implementation of the online learning in various schools in the country, it is a fundamental requirement to have the basic knowledge and skills in ICT. It is imperative to assess the students' knowledge on ICT prior to the implementation of the online learning modality. Thus, this study aims to determine the level of awareness of the SHS

TVL - ICT students in computer software applications and internet literacy. The study also proves the following hypothesis at 0.05 level of significance:

Ho: There is no significant difference between the levels of computer software application awareness when their demographic profile is taken as factor.

2. Literature Review

Students' Knowledge and Skills in ICT

Most, if not all, tasks necessitate the use of ICT. The education sector is not immune to this, as information and communication technology (ICT) has enhanced teaching and learning methods and made them less difficult. ICT-assisted teaching and learning has expanded beyond the four walls of a classroom to include learning from the comfort of one's own home. This technological innovation has similarly bridged the digital gap between information-rich and information-poor societies.

In the age of e-learning, any educational institution that does not accept the evolution of ICT for teaching and learning would find it difficult to function and compete favorably with their peers. In this age, digital competence is a promising skill to master. However, teaching such a skill is not easy, particularly when the students are not familiar with computers. Senjaya et al. (2018) found in the study that Indonesian high school students were mostly aware of the presence of ICT and regularly engage with ICT devices or services. They also know how to use at least one ICT application or skill. Since high school students have a high level of ICT knowledge, digital competence can be easily taught to them.

ICT encompasses more than simply computers. Numerous IT enthusiasts have defined ICT as a collection of hardware (equipment), software (operating systems, applications, etc.), and communication facilities (Local Area Networks, wide area and backbone networks, communication protocols, etc.). Wang and Woo (2007) defined ICT as a tool that can be hardware (such as computers, digital cameras), software (such as excel, discussion forums), or a combination of the two. More crucially, ICT in the educational setting primarily refers to a variety of resources and technologies that aid in boosting student learning and, hence, in accomplishing learning objectives (Altun et al., 2011).

In the current educational setting, ICT is viewed as a viable instrument for providing educational possibilities in both official and informal settings. ICTs can boost learners' motivation

and involvement during the teaching-learning process. It instills in students a sense of digital literacy, inventiveness, higher-order thinking and good reasoning, as well as effective communication and high productivity (Tinio, 2002). As a result, ICT is viewed as a potent tool in the landscape of education. According to Warschauer (2014), the simultaneous effects of globalization and technological advancement have altered the way teaching and learning is delivered in different subject areas. Thus, ICT have developed into critical literacy skills (Jung 2016).

The ICT proficiency of the teachers is the fundamental area in the effective use of ICT in the teaching and learning. In the study of Esfijani and Zamani (2020), it was revealed that the ICT integration at secondary schools was highly related to the teachers with adequate access to hardware at home and school. It was further revealed that secondary teachers were not proficient in using ICT tools and their technology usage in education, research and communication domains is less than the desired level although they have attended ICT training courses. Similarly, Khalid (2017) found in a study conducted in Malaysia that 77% of teacher respondents were not integrating computing into their classroom instruction due to lack of training and time constraints. This was explained by Singhavi & Basargekar (2020) that proficiency of teachers related to using ICT is affected by school culture, school leadership, access to ICT resources, availability of digital content as well as support received from colleagues and the administration.

With respect to the students' ICT proficiency and its effect on the academic performance, Xiao et al. (2019) determined the effects of the student-level ICT impact factors (the availability of ICT, the use of ICT and attitudes toward ICT) to the reading proficiency of 37,155 15-year-olds from five representative countries with extremely high reading proficiency. It was revealed that ICT-related attitudinal factors (interest in ICT and perceived autonomy in using ICT) were highly correlated to high reading proficiency. Similarly, Basri et al. (2018) found in a study that there exists a relationship between ICT adoption and academic performance in a conservative environment which resulted to the improvement of the performance of female students. However, Banji et al. (2020) identified that the commonest challenges of using ICT tools for learning were lack of opportunity provided by teachers for students to use the tools on their own, inadequate ICT tools and difficulty teaching ICT practical lessons without demonstration. To this, Tanveer (2011) assert that it is critical that both teachers and students develop confidence in using technology through appropriate facilitation using the necessary electronic equipment, training, and time resources.

Computer Software Applications

The digital revolution has dramatically altered daily living, evidenced in the ubiquity of mobile devices and the smooth integration of technology into common chores such as shopping, reading, and finding directions (Anderson, 2016; Smith & Anderson, 2016; Zickuhr & Raine, 2014). The usage of computers, mobile devices, and the Internet is at its highest level to date and projected to continue to expand as technology becomes more accessible, particularly for people in developing nations (Poushter, 2016). In addition, there is an increasing number of people who are smartphone dependent, relying entirely on smartphones for Internet access (Anderson & Horrigan, 2016) rather than more expensive devices such as laptops and tablets.

Computer-based technology (hence referred to as technology) necessitates the use of specialized hardware, software, and micro processing capabilities found on a computer or mobile device. Additionally, student engagement has garnered considerable attention over the last several decades as a result of a shift toward student-centered, constructivist instructional methods (Haggis, 2009; Wright, 2011), mounting pressure to improve teaching and learning outcomes (Axelson & Flick, 2011; Kuh, 2009), and promising studies demonstrating a link between student engagement and positive academic outcomes (Carini, Kuh, & Klein, 2006; Center for Postsecondary Research, 2016; Hu & McCormick, 2012).

3. Methodology

This study used descriptive type of research through survey strategy. The population of the study were the students of Lopez National Comprehensive High School. A purposive sampling method was used in selecting the sample size constituting of thirty-six (36) respondents in different age and year levels. The primary eligibility for the respondent is access to technology, belongs to Grade 11 and 12, and is taking/taken ICT class. The majority of the respondents are 17 – 18 years old (94%), male (75%) and in Grade 12 (72%).

The primary data gathering instrument used in the study is the researcher-made survey questionnaire. This survey tool is composed of two parts: demographic profile of the respondents and computer software application awareness which includes indicators related to the access to computer, software applications used, ICT awareness, and ICT literacy. The instrument was content-validated by the ICT coordinator of the school, the research adviser, and the school research coordinator for students researches. The statements were rated using 5-point Likert scale.

The survey was conducted online due to the current restrictions implemented by the government. During the planning stage, a Gantt chart was created in order to manage and maximize the time. The questionnaire was developed through Google Form. The actual survey was conducted during the last week of December 2020 through online. The student-respondents gave their consent to answer the survey. The Google form was sent to the respondents' social media accounts such as Facebook and Instagram.

The data were analyzed using a parametric test of difference called T-test.

4. Findings and Discussions

Table 1

Students' Access to Computer

Access	Frequency	Percentage	Rank
Home	15	42%	4
Internet Café	17	47%	3
School	36	100%	1
Friends/Relatives	19	53%	2

* multiple responses

Table 1 presents the students' access to computer. It is highly noticeable that the students' main access to computer is only through the school (100%). Although there are students with personal computers at home (42%), there are still students without computer access at home. If computer access is necessary, students find access through internet café (47%) and friends/relatives (53%). The results support the claim of Rosdy (2015) that schools are the main source of ICT competencies which entailed great effects to students.

Table 2

Ranking of Software Applications Used

Access	Rank 1	Rank 2	Rank 3
MS Office Package	36 (100%)		
Desktop Publishing Software		34 (94%)	2 (6%)
Web Designing		2 (6%)	33 (92%)
Computer Programming Languages			1 (2%)

The respondents were asked to rank the top 3 software applications they commonly used within the last three months. The results in Table 2 clearly shows that students mostly use the MS

Office Package with 100% response in Rank 1. This is mainly because the course works and other requirements for the different subjects are normally prepared using MS Word and MS Excel, among other applications. At rank 2 is Desktop Publishing Software as chosen by 94% of the students while Web Designing at rank 3 with 92%.

The results indicate majority of the students used MS Office Package, Desktop Publishing Software and Web Designing within the last three months. The results clearly explained the findings of Correos (2014) that secondary school students commonly used applications in their respective schools during the time of study.

Table 3

Students' ICT Awareness

Indicator	Grade 11		Grade 12	
	WM	Description	WM	Description
Knowledge about the fundamentals of computers (i.e. Hardware and software computer systems, Computer generations etc.).	4.64	Extremely Aware	3.01	Moderately Aware
Knowledge about the fundamentals of Internet (i.e. What is Internet, what are the services offered by the Internet? etc.).	4.00	Very Aware	4.11	Very Aware
Knowledge related to computer concepts such as social, ethical and legal issues.	3.52	Very Aware	2.67	Moderately Aware
Knowledge about at least three ways that computers are used in society.	3.64	Very Aware	4.11	Very Aware
Knowledge about at least three occupations related to computer usage.	5.00	Extremely Aware	4.67	Extremely Aware

Table 3 shows the assessment of the Grade 11 and 12 students' ICT awareness. It is seen that the knowledge relating to the occupations in computer usage had the highest WM value of 5.00 with extremely aware description for grade 11 while grade 12 students also received an extremely aware rating of 4.67 in the same indicator. The lowest for grade 12 is the knowledge related to computer concepts such as social, ethical and legal issues with 2.67 which is the same lowest assessment of the grade 11 with 3.52 WM. Overall, the results show high ICT awareness of both the grade 11 and 12 students. However, the grade 11 students rated themselves more aware on ICT concepts and knowledge than the grade 12 students.

The results of the study relate to the findings of Valdez (2010) that there is a difference between the levels of awareness of students per year level. Similarly, Senjaya et al. (2018) found

that high school students were mostly aware of the presence of ICT and regularly engage with ICT devices or services. Since majority of the classes are online, the classes require students' use of technology.

Table 4

Students' ICT Literacy

Indicator	Grade 11		Grade 12	
	WM	Description	WM	Description
Skills in basic hardware and basic operating system functions – Identifying computer parts, powering up and powering down the computer, open/save files, recognize different file types	4.11	Excellent	4.53	Excellent
Skills in basic hardware and basic operating system functions – Identifying computer parts, powering up and powering down the computer, open/save files, recognize different file types	3.28	Fair	4.28	Good
Skills in word processing – Create/save/print documents, Insert tables/charts/ labels/symbols, Format page layout (margins, page numbers, page borders)	3.67	Excellent	4.75	Excellent
Skills in presentation graphics – Create/save/print slide shows, Insert new slide/layout/tables/charts, Create animations	3.01	Fair	3.78	Good
Skills in databases – Design basic databases with queries and reports/forms	2.11	Poor	2.86	Fair
Skills in Internet & e-mail – Surfing the Internet and sending e-mail messages.	4.01	Excellent	4.33	Excellent

Table 4 shows the ICT literacy of Grade 11 and Grade 12 students. For grade 11 students, the highest rated literacy is on the skills in basic hardware and basic operating system functions with 4.11 WM. This skill includes identifying computer parts, powering up and powering down the computer, open/save files, recognize different file types. Meanwhile, the grade 12 students are excellent on the skills in word processing with 4.75 WM. This skill includes create/save/print documents, insert tables/charts/ labels/symbols, format page layout (margins, page numbers, page borders). On the other hand, the lowest rated skill for grade 11 and grade 12 students is on the skills database with poor and fair rating of 2.11 and 2.86, respectively. This skill pertains to the design of basic databases with queries and reports/forms.

The overall results showed that grade 11 and 12 students are ICT literate. Their knowledge on the ICT concepts and elements depend on the particular software or tool they usually use and apply in their studies. Similar to the findings of Senjaya et al. (2018) that students know how to

use at least one ICT application or skill. As explained by Wang and Woo (2007), students use hardware, software or a combination of the two. Accordingly, as explained by Altun et al. (2011), they use whatever boosts student learning in accomplishing learning objectives.

Table 5

Significant Difference Between Software Awareness and Literacy of Grade 11 and 12 Students

Variables	Year Level	Mean	SD	T Value	Sig Value	Decision	Interpretation
Computer Awareness	11	3.14	0.33	.876	0.04	Rejected	Significant
	12	4.16	0.49				
Computer Literacy	11	3.37	0.76	1.423	0.03	Rejected	Significant
	12	4.08	0.63				
Overall				.954	0.04	Rejected	Significant

Table 5 shows the test of significant difference between the software awareness and literacy of the Grade 11 and Grade 12 students. Using 0.05 as alpha, the sig value is all lower than the alpha, so the null hypothesis is denied. With a sig value of 0.04 on computer awareness, the results proved significant difference in the computer awareness of the grade 11 and 12 students. Similarly, the sig value of 0.03 on computer literacy also rejects the null hypothesis and affirms a statistical significant difference on the literacy of the students.

As Grade 12 students are more experienced in the ICT field than Grade 11 students, based on the results of the study, Grade 12 students are more aware and ICT literate than grade 11 students. This affirmed the study of Griswold (2003) that software awareness between grade levels vary because of the characteristics related to their awareness and social implications. Moreover, the study of Howell et al. (2017) proved the same findings that ICT skills were positively related to some demographics factors.

5. Conclusion

This study used descriptive research through survey strategy to assess the ICT awareness and literacy of the 36 purposively chosen grade 11 and 12 students of Lopez National Comprehensive High School. The results of the online survey conducted through Google Form on December 2020 were analyzed using a parametric test of difference called t-test. The results of the study showed that grade 11 and 12 students have high ICT awareness and literacy. They have complete computer access at the school with MS Office as the primary software being used. The

results further revealed a significant difference in the ICT awareness and literacy of the grade 11 and 12 students. The results suggest substantial differences in attitudes and use habits of the students. Accordingly, male students tend to enroll in ICT courses over female students because of the strand's technical specifications. Similarly, the maturity and time of study of the grade 12 students affected their proficiency in computer applications than grade 11 students. With a significant difference in the computer software applications awareness between grade 11 and grade 12 students the hypothesis is rejected.

Based from the findings, grade 11 students could need more exposure to the poor areas of computer applications such as database management and webpage designing applications. To improve students' knowledge and literacy in database applications, webpage design, and basic computer programming, an enhancement program may be applied to the specialization or integrated into other ICT subjects like empowerment technologies and media and information literacy.

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Error Analysis in Spoken English among Grade 12 Students

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Abstract

This study aimed to identify and categorize the errors in spoken English among Grade 12 students based on the Linguistic Category Taxonomy of classification of errors by Dulay et al. (1982). Mixed sequential explanatory research design was used in the study. Participants were chosen from the two Senior High School strand offered at Aguinaldo T. Repiedad Sr. Integrated School using stratified random sampling. Recorded utterances from the picture-description and interview were analysed for errors using frequency count, mean rank, percentage and Mann-Whitney U Test to determine the major errors and the significant differences of these errors when participants were grouped according to academic track and exposure to English-related media. Results showed that students committed more errors in syntax and articulation of consonant sounds. Moreover, they have difficulty with noun and verb inflections in terms of its morphological component. Additionally, in terms of its syntactical component, the three highest number of errors recorded were on verb, preposition, and noun usage. On the other hand, the students' Senior High School track/strand or exposure to English-related media have no direct influence on the extent of errors the students committed in their utterances. Based on the results, it is recommended that English instruction be strengthened especially in teaching grammar and pronunciation and use authentic and relevant assessment tools when teaching to allow students to practice oral fluency of the target language.

Keywords: *error analysis, linguistic category taxonomy, phonology, morphology, syntax, English-related media*

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1. Introduction

English is used as medium in most professional interactions and various fields like medicine, politics, and education. In the Philippines, English is considered one of the official languages and majority of the subjects use English as medium of instruction. However, the student's ability to communicate in English has become increasingly the subject of concern, especially with the results of the National Achievement Test (NAT) and the 2018 Programme for International Student Assessment (PISA) which have indicated a declining overall performance of students in standardized examinations that uses English as test language. The 2018 PISA test results showed that students in the Philippines scored the lowest in reading while the results of the 2016-2017 NAT revealed that the Mean Percentage Score (MPS) of the English subject is below the national standard of 75%.

According to Mwangi (2009) as cited by Qasim et al. (2019), the use of mother tongue or first language during conversation contributes to poor performance in English. However, the Republic Act No. 10533 or the Enhanced Basic Education Act directs the Department of Education (DepEd) to adhere to the framework of Mother Tongue-Based Multilingual Education (MTB-MLE) where pupils in the Kindergarten to Grade 3 receive instruction, learning materials, and assessment in their respective native language. The learning of the English language often stops in the four corners of the classroom since conversing in English is an uncommon occurrence in the country. This shows that students lack exposure to the target language, English.

Afraid of making grammatical mistakes when speaking, most learners are reluctant to communicate in English inside the classroom. Several factors are plausible but the main reason might be the student's exposure to the English language. The students are not used to using the target language and that it is not the language they use in everyday communication. The continued downward trend in the test results of students taking standardized test that uses English as test language and the student's visible hesitation to speak in English during class discussions are some of the factors that contributed to the subject of this study.

This study was linked to Dulay et al. (1982) as cited by James (2013) that errors are flawed side of learners' speech or writing. The parts of conversation or composition that deviate from some selected forms of mature language performance are considered as errors. According to

Canale (1983) and Canale and Swain (1980) as cited by Chang et al. (2010), achieving effectiveness in communication requires communicative competence which is the mastery of the knowledge of language and the ability to use the knowledge in actual communication.

This study aimed to identify and categorize linguistically the errors in Spoken English among Grade 12 students of Aguinaldo T. Repiedad Sr. Integrated School (ATRSIS) during the S.Y. 2019-2020. The errors in spoken English are categorized according to phonology, morphology and syntax. It also identified language media students are exposed to. The study aimed to prove the following hypothesis:

Ho: There are no differences in the errors in spoken English committed by the Grade 12 students when classified according to (a) track/strand and (b) exposure to English-related media.

2. Literature review

2.1. The Status of English as a Spoken Language

English is the language said to be the most spoken language in the world. In 2017, 20% of the world's population speaks English and is considered to be the most commonly studied foreign language in the world (Lyons, 2017). In the Philippines, the teaching of English language in formal education is deeply rooted. The language was first introduced into the formal educational system on April 7, 1900 when then United States of America President William McKinley issued a Letter of Instruction that declares English as the medium of instruction in all levels of the public educational system in the Philippines.

The fact that the Philippine education system has been using English as a medium of instruction from elementary to university level for decades, indicates the great significance English language plays on the lives of Filipino people. As cited by Mangahas (2016), the 2008 SWS survey revealed that 76 percent of Filipinos nationwide say they could understand spoken English but only 46 percent could speak in English. However, according to Borlongan (2009), most verbal activities of the young generation of Filipinos are dominated by English as the language of current usage. This is in contradiction with the 2018 PISA test results, which revealed that students in the Philippines scored the lowest in reading among 79 countries who took the test.

2.2. Linguistic Category Taxonomy of Errors

On phonological error, the results of the study of Purnama (2019) showed that the biggest phonological errors committed by the students were on diphthongs. On the other hand, Al-Rubaat and Alshammari (2020) revealed that learners experienced errors in phonology related to mispronunciation of voiced or voiceless phonemes. In his study, Risdianto (2017) concluded that EFL Sudanese students' greatest errors in spoken English is on mispronouncing consonant minimal pairs such as /f/ and /v/, /s/ and /θ/ and /ð/ and /z/.

Safrida (2016) determined that the students still have a serious problem in terms of grammatical aspect, especially omission of noun inflections and irregular past tenses, and malformation of auxiliaries while the study of Mardijono (2003) revealed that there are more occurrences of syntactic errors compared to morphological errors. The most predominant syntactical error is on the noun phrase category, while the predominant morphological errors are the basic verb or the unmarked verb used after infinitive to. On syntactical errors, Kamiasi (2019) indicated that errors in verb placed the highest followed by errors in preposition and pronoun. Jahan (2017) concluded that the grammatical errors, such as: verb tenses, word order, pronoun, preposition, article, suffix, prefix, and subject-verb agreement are made due to Language 1 (L1) transfer where the influences of Bengali on the students speaking English are manifested.

The conclusion from the study conducted by Mashoor and Abdullah (2020) elucidates several causes of the students' spoken errors in English. These include the student's lack of vocabulary, motivation, and practice. For instance, Leño (2019) observed the speaking difficulties of Philippine indigenous learners and indicated the limited exposure to the English language, especially in oral activities, had caused speaking problems for the students. Moreover, Hind (2018) as cited by Mashoor and Abdullah (2020) concluded that the Arab student's English-speaking skills and weakness in the linguistics were affected by the influences of the first language and differences of the cultures as well as the teaching methods. Similarly, Ramasari (2017) identified that the students' first language acquisition influenced their pronunciation in speaking English.

The study of Castor et al. (2013) indicated that the most committed errors in spoken English were in the usage of pronoun/antecedent, verb, and preposition. Moreover, the students who are fairly exposed to English-related media committed more errors as compared to those who are highly exposed. Al-Zoubi (2018) has revealed that there is a strong impact of exposure to English language on language acquisition emphasizing that the higher the exposure, the better the learner performs in the target language. Palencia (2009) as cited by Alaga (2015) has also arrived at the

same conclusion stating that those learners who preferred watching English shows, movies and documentaries had a higher chance to improve their English performance. The study of Ortega (2011) revealed that the Icelanders have higher English proficiency levels, when compared to those of their Spanish counterparts, because they have more exposure to English media. Similarly, Tabula (2010) found out that there is a significant relationship between the student-related variables on the type of school graduated from, parents' educational attainment, language used at home, and exposure to mass media and their level of oral exposition skills. Thus, Alaga and Palencia (2015) concluded that print and audio – visual media play important roles in the language performance of the students.

3. Methodology

The mixed sequential explanatory research design was used in the study since it involves the combination of elements of qualitative and quantitative research approaches such as the use of qualitative and quantitative viewpoints in data collection, recording, analysis, interpretation and description (Johnson et al., 2007). As explained by Creswell (2009), sequential explanatory design is characterized by the collection and analysis of quantitative data followed by the collection and analysis of qualitative data.

The participants of this study were the 15 randomly chosen Grade 12 students of Aguinardo T. Repiedad Sr. Integrated School for the School Year 2019-2020. This constitutes the 17 percent of the population. In qualitative research, in terms of sample size, the researcher may identify a small number of participants to provide in-depth information, since the key idea of qualitative research is to provide detailed views of individuals (Creswell, 2006).

The participants were selected using the random sampling design through draw lots method wherein the samples were randomly selected. To ensure objectivity, the listing of population units in the sample frame was arranged in a random order. Three external language validators were assigned to analyze the audio recorded utterances of the participants. These language validators include teachers and master teacher who majored in English and has taught grammar and oral communication for more than 10 years.

The researcher used a picture-description task and interview to gather spoken data from the participants. The spoken English test through the picture-description task was used to enable the

participants to project their internal feelings and attitude towards the given topic. After these tasks, the participants were given a researcher-made questionnaire to ascertain their exposure to English-related media. The external language validators were given a checklist on the categories of errors to be analyzed. Errors from these utterances were identified and categorized based on Linguistic Category Taxonomy from Dulay et al. (1982). However, only the pronunciation and grammar aspect of the Linguistic Category Taxonomy were analyzed.

Frequency count and percentage were used to determine the category and number of errors that the participants committed and their responses to the researcher-made questionnaire. The Mann-Whitney U Test was used to determine the significant difference on the errors committed when participants were categorized into SHS track/ strand and exposure to English-related media. The decision on the significant difference was determined using the p-value. If the p-value is less than or equal to 0.05, the null hypothesis is rejected. If the p-value is greater than 0.05, the null hypothesis is accepted. To describe the participant's exposure to language media, the following criteria were used: L1 indicated that the participants' exposure to English language is less than 30 percent; L2 showed that the participants used mixed language including English; and L3 denoted 100 percent exposure to English as language media.

4. Findings and Discussion

Table 1
Phonological Categories of Errors in Spoken English of Grade 12 Students

Categories of errors	English word	Standard utterance based on IPA	Errors in student's utterances	f
vowel	photo	/fəʊtəʊ/	/fəʊtʊ/	1
	was	/wɒz/	/wʊz/	1
	financial	/faɪ'nænjəl/	/fɪ'nænj(ə)l/	1
	mental	/mɛn tɪ/	/'mɛntɪ/	1
	stolen	/'stəʊlən/	/stəʊlən/	1
	many	/'meni/	/'mɛni/	1
	image	/'ɪmɪdʒ/	/'ɪmɛɪdʒ/	1
	stories	/stɔːrɪz/	/stɔːrɪz/	1
	suicide	/'suɪ,sɑɪd/	/'su sɑɪd/	1
consonant	youth	/ju:θ/	/ju:t/	3
	their	/ðeə/	/deə/	3
	that	/ðæt/	/dæt/	3
	this	/ðɪs/	/dɪs/	2
	they	/ðeɪ/	/deɪ/	1
	thought	/θɔt/	/tɔt/	1
	through	/θru/	/tru/	1

Table 1 reveals the phonological categories of errors committed by Grade 12 students in Spoken English. The results showed that there was a total of 23 phonological errors.

The errors in articulating vowel sounds commonly occur when the learners utter the long /u/ instead of its corresponding diphthongs or short vowel sound as in the word “photo” pronounced as /footu/ instead of /footoʊ/, “was” articulated as /wuz/ as opposed to /wɒz/ and the word “suicide” spoken as /'su said/ instead of /'suɪ,said/. In addition, learners would replace an open-mid front unrounded vowel and schwa with diphthongs as in the word “many” pronounced as /'meni/ rather than /'meni/ and the word “image” articulated as /'imeɪdʒ/ instead of /'ɪmədʒ/. These results coincide with the findings of Purnama (2019).

In terms of errors in consonant sounds, majority of the errors are committed in the articulation of voiced /ð/ and voiceless /θ/ dental fricative where learners replaced the sounds with voiced alveolar plosive and voiceless alveolar plosive respectively. Participants would pronounce the word “their” as /dɛər/ instead of /ðɛər/, “this” as /dis/ rather than /ðɪs/, and “that” as /dæt/ instead of /ðæt/. The errors in voiceless dental fricative can be observed when the participants pronounced the word “youth” as /ju:t/ instead of /ju:θ/ and “through” as /tru/ instead of /θru/. These results concur with the findings of Al-Rubaat and Alshammari (2020) who emphasized that the mispronunciation of voiced or voiceless phonemes is a common error among EFL learners. In addition, Risdianto (2017) also concluded that students’ greatest errors in spoken English are on mispronouncing consonant /θ/ and /ð/.

In this study, the participant’s first language, Akeanon, does not have the diphthongs /oʊ/ and /uɪ/ as well as the consonants /θ/ and /ð/. For this reason, the participants would unconsciously copy the sound from their mother tongue to replace the English phoneme. According to de la Cruz and Zorc (1968), Akeanon has three vowels that are native to the dialect and two which have been adopted under Spanish and/or English influence. The phoneme /u/ is categorized in Akeanon as high back vowel which sounds quite similar to the American English vowel sounds in the words: “root” or “too”. The sounds of /θ/ and /ð/ on the other hand are substituted by /t/ or the voiceless dental stop and /d/ or the voiced dental stop in the Akeanon language. The voiceless dental stop sound is usually formed by bringing the tip of the tongue against the back of the upper teeth while the /d/ is formed like /t/, but with the addition of voice. (de la Cruz & Zorc, 1968)

From the data obtained, the students have confusion pronouncing English phonemes that do not appear in their first language. The production of English phoneme is affected by the sounds that the participants are familiar with in their mother tongue. The same conclusion was presented in the study of Purnama (2019).

Table 2

Morphological Categories of Errors in Spoken English of Grade 12 Students

Categories of errors	Errors in student's utterances	f
Nominalization and plural inflections of nouns	<p>"...Umm there so many teenager that has been pregnant ..."(U1)</p> <p>"...Many youths like me are lack of financial." (U2)</p> <p>"...teens are have--have a difficulty to tell their stories or worries to their parents because of feeling shy and ... and awkwardness..." (U3)</p> <p>"...Uhhm as a youth, I can help him or her uh that victims by-- by just treating him or her nicely...(U4)</p>	4
Verb inflections that indicate tense and number	<p>"...Uhm they cut the hair of the girl and they even split a water in her head..." (U5)</p> <p>"...And sometimes uhm they stammering and in physical activities uhm the the students will not enjoy it..." (U6)</p> <p>"...we should know how to respect uhm each of us by simply not to bully them uhm by her or his uhhh physical appearance..." (U7)</p> <p>"...If they will continue bully her I can I can see in the picture that the girl is weak and can't fight for herself..." (U8)</p> <p>"...As far as I know uhhm the most common problems that a youth like me (utterance) experiencing nowadays are the lack of self-confidence..." (U9)</p>	5
Inflectional and derivational morphology (adjectives)	<p>"...Physical and cyber bullying isn't that easy for a victim because uhh it leads to so many problems to him or her that eventually he or she will uhh feel alone, depressed or worst suicide..." (U10)</p>	1

Legend: U - utterances of the participants during the picture description task and interview.

The results in Table 2 show that the participants committed a total of 10 morphological errors. The following are examples of errors in verb inflections:

In U5, the participant used the wrong formation of simple past tense when she said, "...and they even split a water..." instead of using the past form of the verb, "spilled". In U7, the participant used the infinitive form "...by simply not to bully them uhm by her or his..."

The data suggested that the participants would use the infinitive form of the verb instead of adding -ing inflection. Moreover, the errors in the formation of plural nouns frequently occur. The utterances of the participants also contain numerous fillers which denote hesitations and pauses during the utterance.

According to Safrida (2016) and Mardinojo (2003), these errors in verb inflection appeared due to misapplication of linguistic rules and interference of the respondent's first language. The occurrence of errors can be attributed to the fact that English is not the first language of the participants and the translation between mother tongue to English have affected their application of the linguistic rules. Also, spoken English is more spontaneous than written and the thinking time given is shorter.

Table 3

Syntactical Categories of Errors in Spoken English of Grade 12 Students

Categories of errors	Error in student's utterances	f
Pluralization and noun usage	"...because of feeling shy and ... and awkwardness ..." (U1) "...eventually he or she will uhh feel alone, depressed or worst suicide ..." (U2) "...I can help him or her uh that victims by..." (U3) "...And uhh because of teenage pregnancy some teenager get scared..." (U4) "...Umm there so many teenager that has been pregnant in an early age..." (U5) "...Many youths like me are lack of financial ." (U6) "...Many youth are experiencing lack of confidence..." (U7)	7
Verb tense, number and auxiliary verbs	"...there are one girl who (utterance) bullied by three girls..." (U8) "...and they even split a water in her head and taking photos and videos of her...she already experience bullying..." (U9) "...Many youths like me are lack of financial..." (U10) "...If they will continue bully her I can..." (U11) "...This picture shows that the girl are being bullied by the group of girls that might (utterance) her or cause her depression..." (U12) "...Umm there (utterance) so many teenager..." (U13) "...By simply not to bully them uhm by her or his uhhh physical appearance..."(U14) "...It (utterance)because they believe that they are old enough for taking their own decisions ...And also they don't want their parents to get involve of what they want to do..." (U15) "...the most common problems that a youth experience nowadays I think..." (U16) "...some of them may be lead to depression..." (U17) "...from the picture the victim being abused by his fellow..." (U18) "...teens are have --have a difficulty to tell their stories..." (U19) "...the most common problems that a youth like me (utterance) experiencing ...this (utterance)most commonly experience by the youth..."(U20) "...Lastly, uhh depression wherein, a person experience of a feeling of being lonely..." (U21)	20

Categories of errors	Error in student's utterances	f
Pronoun/ antecedent relation- ship	"...Uhm it will be hard for a youth of course uhm for example when they are reporting in front of the class..." (U22) "...By simply not to bully them uhm by her or his uh hh physical appearance..."(U14) "...Examples to this are posting their uh h image or pictures without his or her permission, telling stories about the victim even if it is not true..." (U23) "...Also, they bully others to post it in social media to be famous and attract attention to his or her follower..." (U24)	5
Articles/ determiners	"...there are one girl who (utterance) bullied by three girls..." (U8) "...and they even split a water in her head..." (U9) "...teens are have--have a difficulty to tell their stories..." (U1)	3
Adjectives (degree of comparison and inflections)	"...Many youths like me are lack of financial ..." (U10) "...to prove that they are most popular to that person..." (26) "...because of feeling shy and and awkwardness..." (U1) "...he or she will uh h feel alone .. depressed or worst.. suicide ..." (U25)	4
Adverbial clause	"...And as a student we should stop bullying because we can't get something about it and because of bullying we can hurt feelings..." (U26)	1
Prepositional idioms and phrases	"...and they even split a water in her head..." (U9) "...their faces look uhm so satisfied for what they are doing..." (U27) "...bully them uhm by her or his uh hh physical appearance...we should accept them of what they really are..." (U14) "...thinks that they can do anything by their own shoulders..." (U28) "...old enough for taking their own decisions ... get involve of what they want to do..." (U15) "...attract attention to his or her follower..." (U24) "...a feeling that you are burdened of certain problems..." (U29) "...the most common problem of a youth like me..." "...we can't get something about it..." (U26)	11
Conjunctions	"...And as a student we should stop bullying because we can't get something about it and because of bullying we can hurt feelings..." (U26) "...And uh h because of teenage pregnancy some teenagers get scared to tell their parents umm that cause them family problems in case the parents find out about it..." (U30) "... This most commonly experience by the youth like ummm for example academic factors .. uh h being rushed on paper works and other activities ..." (U31)	4
Word Order	"...And sometimes uhm they stammering and in physical activities uhm the the students will not enjoy it because they are afraid to make a wrong move to cause embarrassment..." (U33) "...And when the pe—when wo-- and when the father is not responsible with the teenage mom some of them may be lead to depression that is hard to overcome and may be lead to suicidal thought..." (U17)	2

Table 3 reflects that a total of 54 syntactical errors were committed by Grade 12 students in Spoken English. The following were examples of errors in verb, preposition and noun:

a.) for verb tense, number and auxiliary verbs

The participant in U8 committed a subject-verb agreement error when she said: “As I describe the picture, there are one girl who bullied by three girls...” The statement in U9 “...and they even split a water in her head and taking photos and videos of her” contains errors in verb tense, parallelism and proper use of preposition.

Errors in verb tense and preposition were noted from the statement in U15 when the participant said “...to get involve of what they want to do...”, instead of “...they don’t want their parents to get involved in what they want to do...” The participant in U18 omitted the helping verb in the statement “...the victim (utterance) being abused by his fellow...” and committed errors in verb inflection and article in the statement “...teens are have a difficulty...” (U19)

b.) for prepositional idioms and phrases

The participant committed an error in the use of preposition in his statement “a feeling that you are burdened of certain problems” (U29) instead of “...burdened with...” Moreover, he also used the wrong preposition and pronoun in the statement “we should accept them of what they really are” (U14) instead of “... for who they really are...”

c.) for the use of noun

In U1, the participant committed an error in her statement, “because of feeling shy and awkwardness...” instead of “because of shyness and awkwardness...” Furthermore, in U2, the participant committed an error in his statement, “he or she will uhh feel alone depressed or worst suicide” instead of “...feel alone, depressed or worst suicidal.”

The analysis of the utterances showed that learners have confusion in the use of auxiliary verbs and formation of verb tenses; formation of prepositional idioms and phrases that begin with on, in, of, with, for and to; and nominalization as well as noun inflection using -s. In relation to tense formation, the data revealed that learners were uncertain when to use the progressive form of verbs, how to form the past tense of irregular verbs, and when to use auxiliary verbs. This was seen when they mixed tenses in their spoken English during the picture-description task and interview. In most instances, learners tend to use the wrong prepositions in their utterances. The dominant errors in verb formation and correct usage of prepositions were also noted from the study of Kamlasi (2019) and Jahan (2017). These errors might have occurred due to the student’s misunderstanding of the use of rules in grammar, lack of practice and the influence of the

respondent's first language. The study conducted by Mashoor and Abdullah (2020) have also stated the same factors.

Table 4

Summary of Errors in Spoken English of Grade 12 Students

Errors in Spoken English	f (90)	Percentage 100%
Phonological Errors	23	25.6
Morphological Errors	10	11.1
Syntactical Errors	57	63.3

In view of the data from the table 4, the highest number of errors committed by Grade 12 students fall under the syntax category with 63.3%. This indicates that the learners still have confusion with regards to the proper application of grammar rules. Jahan (2017) has also noted the same decision.

Table 5

Language Media Exposure of Grade 12 Students

Media Exposure	Language Used					
	About 70 percent of the language used is not in English		Uses mixed language including English		Uses pure English	
	f	%	f	%	f	%
Mass Media						
Favorite local or international TV program	12	80	0	0	3	20
Songs listened to in the past weeks	0	0	3	20	12	80
Movie or video watched in the past weeks	0	0	12	80	3	20
Books/publication/printed materials read in the past weeks	12	80	3	20	0	0
Social Media						
Medium/ language used in social media platforms	0	0	15	100	0	0
Medium or language used when surfing the internet	0	0	15	100	0	0
Communication Context						
Medium or language used when talking with friends	0	0	15	100	0	0
Medium or language used when talking with family members	9	60	6	40	0	0

Table 5 reveals the languages used by the participants in the different English-related media such as Mass Media, Social Media and Communication Context.

Mass Media

Favorite TV program. 12 or 80% of the participants watched TV programs which use Filipino as medium while three or 20% watched TV programs which use pure English as medium.

Songs. The results showed that 12 or 80% of the participants listened to English songs while three or 20% listened to songs sung using mixed language including English.

Movie or Video. 12 or 80% of the participants have watched movies or videos that use mixed language including English as medium while three or 20% have watched English movies or videos.

Books/Publications/Printed Materials. The results revealed that 12 or 80% of the participants have read books/publications/printed materials written in language of which majority is not in English while three or 20% have read books/publications/printed materials in mixed language including English.

Social Media

Medium/ Language Use in Social Media Platforms. 100% of the participants of the study used mixed language including English when communicating or commenting in the different social media platforms.

Surfing the Internet. 100% of the participants used mixed language including English in surfing the internet.

Communication Context

Talking with Friends. 100% of the participants of the study used mixed language including English in talking with friends.

Talking with Members of the Family. Nine or 60% of the respondents communicated with members of the family in Mother Tongue and only used English sparingly while six or 40% used mixed language including English.

The data indicated that the participants have little to no exposure to language media that uses pure English. This clearly showed that the participants have limited opportunities to practice

using the target language. This result contradicted with the findings of Alaga and Palencia (2015) asserting that majority of their participants used the English language when accessing various forms of print, audio and audio-visual media.

Table 6

Difference in the Errors in Spoken English among Grade 12 Students when Classified as to their Track/Strand

Errors	Strand	Mean Rank	Z	p-value	Interpretation
Phonological Errors	TVL	4.00	1.155	0.248	Not Significant
	GAS	2.33			
Morphological Errors	TVL	3.50	0.609	0.543	Not Significant
	GAS	2.67			
Syntactical Errors	TVL	2.75	0.296	0.767	Not Significant
	GAS	3.17			
Overall Errors	TVL	4.00	1.291	0.197	Not Significant
	GAS	2.33			

The results in Table 6 reflect that there is no significant difference in the overall errors in spoken English of Grade 12 students when classified according to their strands as shown by the p-value of 0.197. Likewise, Grade 12 students' phonological errors (p-value = 0.248), morphological errors (p-value = 0.543), and syntactical errors (p-value = 0.767) are not significantly different when the students are grouped according to their strands.

The results showed that regardless of the strand of the students, the variation in the extent to which they commit errors in spoken English, is not significant. This confirmed the study conducted by Castor et al. (2013) stating that there was no significant difference in the Linguistic Category Taxonomy errors committed by BSED English Majors when participants are grouped into college level.

Table 7 shows that there is no significant difference in the phonological errors committed by the participants regardless of whether they watched L1 or L3 TV programs (p-value = 0.157), listened to L2 or L3 songs (p-value = 0.480), read L1 or L2 printed materials (p-value = 0.480), watched L2 or L3 movies (p-value = 0.157), and talked with family members in L1 or L2 (p-value = 0.76).

Table 7

Difference in the Phonological Errors in Spoken English among Grade 12 Students when Classified according to the Language Used in English-Related Media

Errors	Language Used in English-Related Media	Mean Rank	Z	p-value	Interpretation
Phonological Errors	TV Programs				
	L1	3.50	1.414	0.157	Not Significant
	L3	1.00			
	Songs				
	L2	4.00	0.707	0.480	Not Significant
	L3	2.75			
	Books/Printed Material				
	L1	2.75	0.707	0.480	Not Significant
	L2	4.00			
	Movie/Video				
	L2	3.50	1.414	0.157	Not Significant
	L3	1.00			
Talking with Family Members					
L1	2.33	1.155	0.76	Not Significant	
L2	4.00				

Legend: L1 – About 70 percent of the language used is not in English; L2 - Uses mixed language including English L3 - Uses pure English

As reflected in the table, the students prefer to use mixed languages when communicating in various contexts. This implied that the students have very little contact with the different forms of media that use pure English. Because of this, they were not exposed to native speakers of the language as well as the international standards of pronunciation which resulted to the errors in utterances. This concurs with the result of the study of Leñaño et al. (2019), who emphasized that the limited exposure of students to the English language cause speaking problems.

Table 8 shows that there is no significant difference in the morphological errors committed by the participants regardless of whether they watched L1 or L3 TV programs (p-value = 0.264), listened to L2 or L3 songs (p-value = 0.136), read L1 or L2 printed materials (p-value = 0.136), watched L2 or L3 movies (p-value = 0.264), and talked with family members in L1 or L2 (p-value = 0.543).

Table 8

Difference in the Morphological Errors in Spoken English among Grade 12 Students when Classified according to the Language Used in English-Related Media

Errors	Language Used in English-Related Media	Mean Rank	Z	p-value	Interpretation
Morphological Errors	TV Programs				
	L1	2.63	1.118	0.264	Not Significant
	L3	4.50			
	Songs				
	L2	1.00	1.491	0.136	Not Significant
	L3	3.50			
	Books/Printed Material				
	L1	3.50	1.491	0.136	Not Significant
	L2	1.00			
	Movie/Video				
	L2	2.63	1.118	0.264	Not Significant
	L3	4.50			
	Talking with Family Members				
	L1	2.67	0.609	0.543	Not Significant
L2	3.50				

The data revealed that students rarely read printed materials or talk to family members in English. However, they did listen to songs and watch TV programs and Movies/Videos in different languages including English.

This signified that majority of the participants were not exposed to media that use pure English which resulted to “not significant” interpretation in the difference in the morphological errors in spoken English of students. Since the students have little exposure and practice in using the target language, this resulted to errors in the application of linguistic rules. This conformed with the study of Castor et al. (2013) and Al- Zoubi (2018), which highlighted that exposure to English media has a strong impact to the language acquisition of learners; where the higher the exposure, the better the learner performs in the target language.

Table 9 shows that there is no significant difference in the syntactical errors committed by the participants regardless of whether they watched L1 or L3 TV programs (p-value = 0.147), listened to L2 or L3 songs (p-value = 0.717), read L1 or L2 printed materials (p-value = 0.717),

watched L2 or L3 movies (p -value = 0.147), and talked with family members in L1 or L2 (p -value = 0.767).

Table 9

Difference in the Syntactical Errors in Spoken English among Grade 12 Students when Classified according to the Language Used in English-Related Media

Errors	Language Used in English-Related Media	Mean Rank	Z	p-value	Interpretation
Syntactical Errors	TV Programs				
	L1	2.50	1.451	0.147	Not Significant
	L3	5.00			
	Songs				
	L2	3.50	0.363	0.717	Not Significant
	L3	2.88			
	Books/Printed Material				
	L1	2.88	0.363	0.717	Not Significant
	L2	3.50			
	Movie/Video				
	L2	2.50	1.451	0.147	Not Significant
	L3	5.00			
	Talking with Family Members				
	L1	3.17	0.296	0.767	Not Significant
L2	2.75				

The figures in the table reflected that students watched TV programs and Movies/Videos, as well as, listened to songs in different languages including English but seldom talked to family members or read printed materials in the target language, English. This indicated that the participants have too little exposure to media that use pure English which resulted to “not significant” interpretation in the difference in the syntactical errors in spoken English of students. On the contrary, if students were exposed to media that use pure English, the results might have been significant. As Tabula (2010) found out, there is a significant relationship between the language used at home and exposure to mass media and the level of communication skills of students.

Table 10

Difference in the Overall Errors in Spoken English among Grade 12 Students when Classified according to the Language Used in English-Related Media

Errors	Language Used in English-Related Media	Mean Rank	Z	p-value	Interpretation
Spoken English Errors	TV Programs				
	L1	3.00	0.00	1.00	Not Significant
	L3	3.00			
	Songs				
	L2	3.00	0.00	1.00	Not Significant
	L3	3.00			
	Books/Printed Material				
	L1	3.00	0.00	1.00	Not Significant
	Movie/Video				
	L2	3.00	0.00	1.00	Not Significant
Talking with Family Members					
L1	2.33	1.291	0.197	Not Significant	
L2	4.00				

Table 10 shows that there is no significant difference in the overall errors committed by the participants regardless of whether they watched L1 or L3 TV programs (p-value = 1.00), listened to L2 or L3 songs (p-value = 1.00), read L1 or L2 printed materials (p-value = 1.00), watched L2 or L3 movies (p-value = 1.00), and talked with family members in L1 or L2 (p-value = 0.197).

The students have limited exposure to media that use pure English since they prefer to communicate using mixed languages in various contexts. This resulted to “not significant” interpretation in the difference in the overall errors in spoken English of students. However, the results might have been significant if students were to exposed to English-related media. As Palencia (2009) as cited by Alaga (2015) has suggested, learners who watched English shows had a higher chance to improve their performance, compared to those who do not. Consequently, Ortega (2011) also confirmed that students who have more exposure to English media have better English proficiency than those who have limited exposure.

5. Conclusion

This study revealed that the highest number of errors committed using Linguistic Category Taxonomy were errors in syntax with 57 errors or 63.3%, when Grade 12 students are taken as an entire group. The students have recorded a high number of errors in the articulation of the consonant sounds with 14 errors, when categorized according to phonological errors; the highest number of errors recorded for morphological errors were verb inflections with five errors; while in syntactical errors, the three highest number of errors were recorded under verb, preposition and noun with 20, 11 and seven errors, respectively. Moreover, the Grade 12 students preferred to use mixed language including English when interacting in different settings such as mass media, social media and communication contexts. Majority of the learners were inclined to watch TV programs as well as read books and other printed materials in Mother Tongue or Filipino. However, 80% of the participants did listen to English songs. Results further revealed that there was no significant difference in the overall errors in spoken English of Grade 12 students when classified according to their track/strands as shown by the p-value of 0.197. There was no significant difference in the overall errors in spoken English of Grade 12 students when classified according to their exposure to English-related media as shown by the p-value of 1.00 and 0.197.

The students still have confusion with the appropriate use of grammar rules as observed from the high frequency of errors in syntax. In terms of phonological categories of errors, it can be concluded that students have difficulty articulating consonant sounds such as /ð/ and /θ/. The errors occur because the English phonemes do not appear in the first language of the participants and the articulation of sounds were influenced by the participant's mother tongue. In terms of morphological errors, the participants committed the highest number of errors in verb inflections indicating poor application of the rules governing word formation. The errors in this linguistic component was caused by the misapplication of linguistic rules and interference of the participant's first language. For syntactical errors, the students were still confused with subject-verb agreement, proper use of preposition and noun usage. This occurred because of the participant's confusion about the grammar rule restrictions and their incomplete application of these rules, the influence of the mother tongue transfer, lack of practice and motivation, and their own English learning habits.

The Grade 12 students have little exposure to English-related media as shown in their preference to watch non-English TV programs and movies as well as read books and other publications written in Filipino or Mother Tongue. Most of the participants used mixed language including English when interacting in different settings such as mass media, social media and communication contexts. This indicated that the students have very limited opportunities to practice communicating in English. Concerning this result, the exposure to English-related Media as well as students' track/strand have no significant effect to the errors in spoken English of Grade 12 students. Since the students have limited exposure to media that use pure English, this resulted to "not significant" interpretation. On the contrary, if students were exposed to media that use English as medium, the results might have been significant.

Sufficient opportunities to practice speaking in the English language, whether inside or outside the classroom, should be emphasized such as encouraging students to speak in English during class discussions as well as initiating club and extra-curricular activities where students can have access to various English media. In addition, English instruction should be strengthened, through the production of speaking drills and activities as well as grammar worksheets suitable to the developmental needs of Senior High School students, to improve their oral communication competence. A balance between teacher's guidance and corrections whenever errors occur as well as students' self-correction of grammatical errors while speaking should be always emphasized to help refine the students' English-speaking skills.

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Looking Through the Lens of Rural Science Teachers in the New Normal Setting

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Abstract

Teaching science in distance learning has severely challenged the educators in maintaining a quality learning experience during the pandemic. This also opened to new experiences for science teachers to facilitate learning in a new normal setting, especially in rural schools. This qualitative phenomenological study aimed to describe the lived experiences of rural science teachers during the new normal learning. Ethical standards on trustworthiness and rigor were followed. Five (5) participants were purposively chosen through criterion sampling with the following criteria: 1) should be a junior/senior high school rural teacher 30-55 years old. 2) Should be teaching science in the school year 2020-2021. 3) Should be willing to express and share their experiences. Data were collected from unstructured interviews. Narratives were transcribed word for word and reflectively analyzed using Braun and Clarke's (2006) thematic analysis. Analyzed data revealed four (4) dominant themes: (1) 4A's of New Normal: Accept, Arrange, Adjust, and Adapt. (2) Dare to Teach: Agents of Learning, Frontliners of Teaching. (3) Facing New Variants of Students. (4) A Dose of Hope: Educators' Response to Learning Emergency. The findings of the study contributed to a deeper understanding of the experiences of rural science teachers as they facilitate learning amidst the pandemic. Implications were derived based on the findings. It is challenging for science teachers to grasp students' attention in learning through a modality away from the instructors. Meaningful learning in science has been facilitated using the teachers' interventions through localized experiments, modified activities, and demystified lessons.

Keywords: *education, science teachers, rural schools, lived experience, new normal setting, descriptive-phenomenology*

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1. Introduction

The pandemic caused a huge impact on the basic education system, around 87% of the student population across the globe were affected by the school closures (UNESCO, 2020). Since the primary concern is the health and safety of the citizens, especially youths, schools were forced to close. All classes were cancelled, and school activities were suspended. According to Malipot (2020), the Department of Education (DepEd) Secretary in the Philippines declared that even though the country is facing the impacts of the COVID-19 virus, education must continue. There are approximately 27 million students in basic education that require unconquerable commitment in the middle of this pandemic.

There were no face-to-face classes in the Philippines until the country is safe from the virus, put forward to the DepEd to adopt the Basic Education Learning Continuity Plan (BE-LCP) under the DepEd Order No. 12 series of 2020. The BE-LCP is anchored with the primary principles such as protecting all learners, teachers, school heads, and other personnel from the threat of transmission of Covid-19 disease. It also ensures the alignment of the K-12 curriculum to the learning standards applicable in the country's current state (DepEd, 2020).

The DepEd provided learning modalities applicable during the pandemic, distance learning and blended learning is on top of the choices of the schools. Distance learning is described as the learning modality wherein teachers and learners are of different locations during the instruction. Under this modality are the modular-based learning, online-based learning, and television or radio-based instructions. On the other hand, blended learning refers to the learning modality wherein distance learning and face-to-face instruction is combined. Learning instructions were refined, aligning to the K-12 curriculum to the Most Essential Learning Competencies. This MELC answers the standards and competencies that the students should achieve amid the challenges in education brought by the Covid-19 (DepEd, 2020). However, certain subjects, such as science, require teachers' intervention for students' better comprehension.

Teaching science in new normal learning has severely challenged the teachers in maintaining a quality learning experience during the pandemic (Porter, 2020). Science teachers are expected to expose learners not just to laws and theories that build the pillars of science education; students should also be engaged with observations, experiments, and other first-hand experiences. However, the sudden shift of learning modality opened new experiences for science educators to facilitate learning in a new normal setting, especially in rural schools. Since students'

locations are far apart within these rural communities, teachers strive to reach their students during the new normal learning.

This study aims to have a deep understanding of the lived experiences of rural science teachers during the new normal learning setting of education. The study recognizes the struggles, challenges, and coping strategies of rural science teachers in response to the circumstances in their locality. It intends to determine insights from the experiences of rural science teachers from which themes will emerge as the findings of the study. The outcomes of this study could be used to address issues and concerns of science teachers in the rural context and can enhance teaching and learning processes in new normal learning.

2. Literature Review

2.1. Rural Schools under the New Normal Education

Teaching in rural schools is quite challenging as it comprises different students who have individual curriculum programs. In addition to that, the lack of learning resources, internet access and facilities (Figueroa, Lim & Lee, 2016). According to Malipot (2020), students in rural communities have little to no access at all to internet and electronic learning modalities. Thus this would lead to greater possibilities that rural schools will be academically left behind in the new normal of education. On the contrary, DepEd argued that the learning modes in rural schools would be done without using the internet and instead television and radio-based or modular learning instructions. However, the teacher's intervention and monitoring process still require technological applications. The shortfalls of rural schools require government response to still provide quality education to remote communities (Malipot, 2020).

Regardless of any distinction, the primary role of the teacher in school is to serve as the bridge between the curriculum and the students (Jadhav & Patankar, 2013). Thus, despite the closure of schools, teachers are responsible for providing quality education to all learners. However, the changes in the curriculum because of the emergence of the Covid-19 gave challenges to rural teachers, especially on those teachers instructing subjects whose nature includes content knowledge and practical skills.

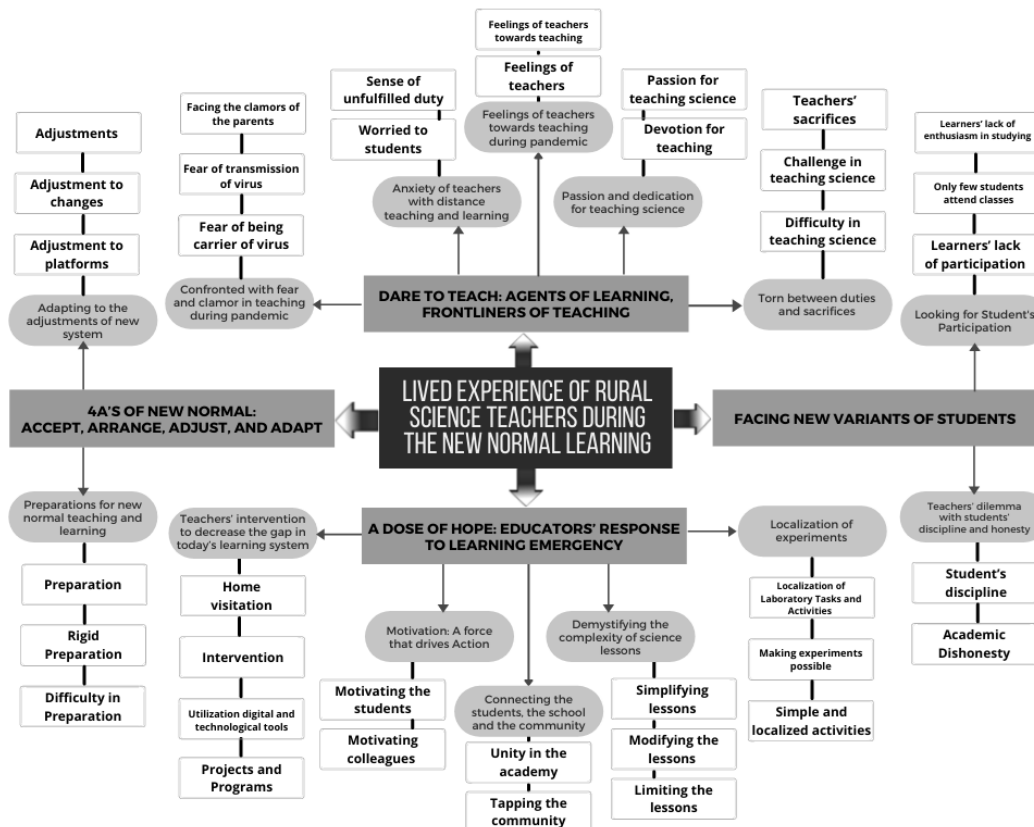
Science education encompasses understanding, applying and demonstrating scientific skills that would develop scientific literacy among the learners. The science framework for Philippine basic education sees science as a subject that would enable students to "learn how to

learn". This can be achieved by developing students' scientific inquiry, promoting core knowledge on science and enhancing students' practical scientific skills (SEI-DOST & UP NISMED, 2011). Teachers are expected to expose learners, not just to laws and theories that build the pillars of science education, and students should also be engaged with observations, testing, experiments and other first-hand experiences. Science educators are in charge of translating the understanding of knowledge on science to meaningful classroom experiences. They will help the learners be scientifically literate and make an informed judgment in addressing social, health and environmental issues using scientific knowledge and skills. Through the help of these dedicated rural teachers, even though profoundly challenged due to the sudden shift of education, and the threat of the coronavirus, quality education of the youths is sustained.

2.2. Conceptual Framework

Figure 1

Thematic Scheme of the Lived Experience of Rural Science Teachers during the New Normal Setting



According to Grant and Osanloo (2014), in a qualitative research design, the researcher may begin the study with a less structured theoretical framework to avoid preconceptions to intervene in the findings of the study. In addition to that, one primary principle of conducting qualitative research is doing it inductively. Thus, the researcher should avoid theoretical framework, presumptions, and knowledge prior to the study to limit the biases on the data analysis (Khankeh, 2014). Therefore, theoretical frameworks may emerge based on the analyzed data. Subsequent with the deep reflection and analysis on the essence of teachers' experiences, the study made it possible for the researcher to represent the lived experience of rural science teachers in a schema as shown in the figure 1.

There are four (4) major themes that emerged from the narratives of the participants. The first theme, entitled 4A's of New Normal: Accept, Arrange, Adjust, and Adapt, represents the four-word phases of how teachers embrace the new system of teaching and learning processes amidst the pandemic. This theme comes from two subthemes that were formulated using codes from the verbatim of the participants. Based from the narratives of the teachers' codes such as "prepare" and "adjust" were commonly used in describing their planning phase for distance learning during the pandemic. Accepting the situation of schools put into their minds that even faced with a plethora of changes and challenges brought by the implementation of new normal learning, they should continue teaching the youth of the society. That mindset drives into action in preparing and arranging the needed plans for the school year. As they actively apply their strategies with the setting of education, they eventually adjust and continuously adapt to the reforms on learning.

The second theme, Dare to Teach: Agents of Learning, Front liners of Teaching, reveals that parallel to the job of health workers, science teachers also put their lives in the front line as this theme is composed of narratives that discuss the apprehensions and sacrifices of the teachers. The theme came from five subthemes that emerged from similar experiences among the participants of the study. They all highlighted their hardships in teaching amidst the pandemic and their worries in teaching science in the new normal. These teachers were holistically challenged as their personal and work-related concerns were uncovered to be at stake, thus indicating their love and passion for teaching science behind the siege of new normal education.

The third theme, which is coined as Facing New Variants of Students, represents teachers' experiences in connection to the identified new version of students learning away from their instructors. They shared how difficult to impose discipline and management of students beyond

the screens and miles away from their teachers. This shows how teachers deal with the character of learners towards distance learning. The theme was from the combined thoughts of teachers' dilemma on the discipline, honesty towards outputs, and students' attention during this year's classes.

Then lastly, the fourth theme signifies the lived experience of science teachers as they showed their role as the cure for the crisis in education brought by Covid-19. It came from five subthemes that represent that teachers' intervention with the underlying problems posed by today's educational setup. Their story on how they give this theme entitled A Dose of Hope: Educators' Response to Learning Emergency composes the projects and interventions created and conducted by the science teachers to give light to the deficiencies post by modifying the learning curriculum. Indeed, teachers bridge the gap between the school and students to decrease learning gaps amidst the pandemic.

3. Methodology

Research Design

This study used a qualitative phenomenological research approach to explain rural science teachers' lived experiences during the new normal setting of education. According to Creswell (2014), the qualitative research method is used to understand and explore the significance of rendering the complexity of a human or social situation. In addition to that, it is essential to consider that the lived experiences of the person can explain a specific phenomenon thus, a phenomenological research method aims to describe features of any lived experience of a group of individuals who are the primary source of information, situation, or event common to all (Creswell, 2013).

A descriptive phenomenological approach supports the design of the study as it is most helpful in finding out meanings of universal structures of a phenomenon. From the ideas of Edmund Husserl cited by Hall et al. (2016), descriptive phenomenology can give accounts from the participants to provide an essence of the lived experiences. Since new normal education is a recent reform in the country, there are still few researches about the experiences of rural teachers during the Covid-19 pandemic to fill in the gap; therefore, appropriate to utilize a descriptive phenomenological approach.

Population and Sampling

The teachers as the participants of this study were chosen through purposive and snowball sampling. In qualitative research, purposeful sampling is commonly used to identify and select participants that would willingly represent cases of a particular phenomenon (Palinkas et al., 2015). Due to the current situation, the researcher also applied snowball sampling as prior subjects refer to other participants that answered the difficulty of finding samples for the study (Naderifar et al., 2017). In line with the sampling technique, co-researchers were selected using the following inclusion criteria: should be a junior/senior high school rural teacher 30-55 years old; should be teaching science in the school year 2020-2021; and should be willing to express and share their experiences. After careful selection of the co-researchers based on the inclusion criteria set by the researcher, initially, five (5) rural science teachers in selected schools in Quezon, Province were chosen.

Data Gathering Procedure

Informed consent was provided by the researcher that provides the participants with sufficiently detailed information on the study to make an informed, voluntary and rational decision to participate. It was sent to the qualified participants, then was signed, and the day and time of interviews were scheduled based on the participant's availability. Interviews were taken about 20 to 45 minutes to ensure that the data gathered were sufficient. Phone and online interviews were conducted through Zoom, Google Meet, and Video/Audio call on Messenger. The researcher used the unstructured interview format with an opening question of "What are your experiences as a rural science teacher during the new normal setting of education?" An unstructured interview was utilized to ensure that the co-researchers led the conversation and not by the researcher. As Mitchell (2015) noted, this type of interview provides an in-depth personal experience from the participants and elicits greater meaning from their answers. Teachers were encouraged to talk freely and to tell stories using their own words. Follow-up questions were asked to clarify thoughts, feelings, and meanings of what was expressed and gain a deeper understanding of the phenomenon. After the interview, the audio recordings were immediately saved to a laptop before transcription. Significant words, phrases, and sentences or paragraphs were extracted from the interview from the raw transcriptions.

Ethical Consideration

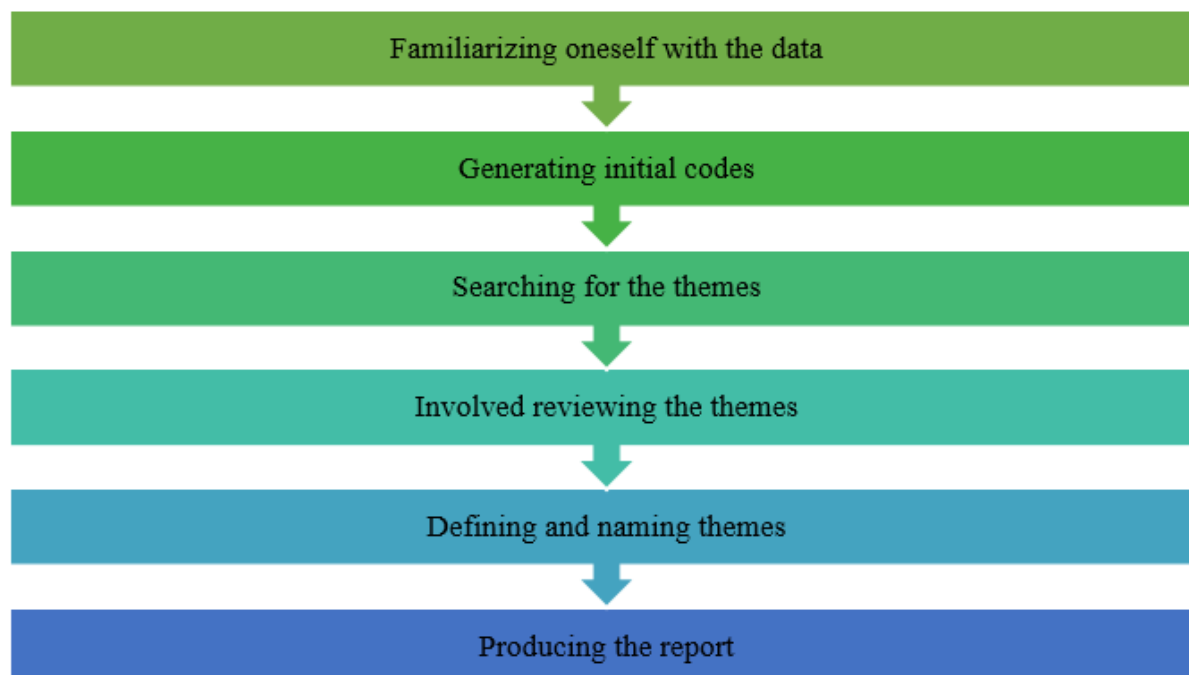
Ethical consideration is significant in conducting research so that the researcher attains the promotion of knowledge and truth, which is the primary goal of research. Therefore, ethical clearance was requested from the researcher's adviser to review all the questions that the researcher asked from the participants. All the participants were of their own free will, and that they were fully informed regarding the procedures of the research project. The researcher ensured the confidentiality of the participants as well as the data given by them. The participants chose and were given a pseudonym by the researchers to guarantee their privacy and anonymity. Additionally, any communication concerning the research was done with honesty and transparency, avoidance of misleading information, and the representation of primary data findings in a biased way.

Trustworthiness and Rigor

In evaluating qualitative studies, trustworthiness is a criterion to ensure that the method is truthful and consistent. To avoid the manipulation of the information and accuracy of the findings, the researcher applied bracketing of insights, assumptions, and interests, which involves subjective endeavors that potentially affect the project (Tufford & Newman, 2012). The process of bracketing was applied throughout the entire procedure of the study. The study established dependability by using an inquiry assessment. The consistency of the step-by-step procedure was reviewed by having external reviewers that will study the gathered data. The study ensured that the interviews and transcriptions of data were encoded and recorded available in the paper's appendices. The participants confirm the essential themes based on the data analysis. This process served as recognizing the universal phenomenon as stated by De Chesnay (2014); acknowledging the description of a phenomenon by the individuals who share the same experiences could successfully achieve phenomenological study.

Data Analysis

Sundler et al. (2019) provide procedures that constitute the actions to undertake in rigorous exploration of the subject participants' lived experience using thematic analysis in descriptive phenomenology defined by Braun and Clarke (2006). The study utilized the methods of the thematic analysis of data collected.

Figure 2*Methods of Thematic Analysis*

Source: Braun and Clarke (2006)

According to Braun and Clarke (2006), the thematic analysis identifies and analyzes patterns within the data collected widely used in a qualitative research design. This procedure can give the researcher the ability to describe complex information in a rich and detailed manner. In addition to that, an inductive approach to thematic analysis is used to help the researcher determine the themes from the data gathered.

4. Findings and Discussion

Themes

Subsequent to the reflection of the interview narratives, four major themes emerged from the participants' verbatim: (1) 4A's of New Normal: Accept, Arrange, Adjust, and Adapt, (2) Dare to Teach: Agents of Learning, Front liners of Teaching, (3) Facing New Variants of Students (4) A Dose of Hope: Educators' Response to Learning Emergency. The themes were constructed from the narratives of the participants and were validated and counter-validated by the participants and with the adviser.

Theme 1: 4A's of New Normal: Accept, Arrange, Adjust, and Adapt

After a precise analysis and reflection of the narratives, *4A's of New Normal: Accept, Arrange, Adjust, and Adapt* was the first theme that comes out. Two sub-concepts were identified under this theme: (1) preparations for new normal teaching and learning and (2) adapting to the adjustments of the new system. This theme highlights how the teachers accepted the challenge of implementing the Basic Education Learning Continuity Plan. They shared their experiences from their preparations for the school year amid the pandemic, arrangements of the working force, planning of teaching processes and how these educators adjust and continuously adapt to the sudden changes in the new normal education system. *Leoncio* shared his experience on how they prepare for the new normal learning.

“So, the survey happened before school year has begun which during May we had that what we call “Balik Eskwela” that we were there [school] having a meeting, we were discussing and we also had, kindly take note as well that the teacher conduct the so-called learning action cell where each department conversed regarding that [learning continuity plan] and also as a whole, there was also a general what we call LDM, or Learning Delivery Modalities where all the teachers had a session within each district about what preparations and what they should do beyond the pandemic.”

Josette also shared how their school arranged for the implementation of a learning continuity plan:

“So, during the peak of vacation in April, the school started to make a plan because it is also a directive of DepEd that time, the so-called Learning Continuity Plan, so one of the suggestions of [our] the principal was synchronous and asynchronous so during those vacation time we undergone a rigid training about the uses of gadgets and then creating [contents on] our main platform.”

After all the preparations and arrangements made by the teachers, they discussed how they adapt to the adjustments brought by the new system. Ma'am *Josette* stated that:

“I'm that fast [on coping with the changes], I easily adjusted it is because we were trained how to used [the new platform], how to create exam before the school year began, because we had few weeks that each day have

different topics, like at first how to launch meeting, what button should be clicked, it [training] was quite detailed, then next one was how to present word file from the PowerPoint on the zoom...so we were taught about those [during the training]... that's why during the start of classes, we were quite not afraid or felt intimidated at all... but I was intimidated at first"

Ma'am *Fe* also accepted that they have to adjust to the changes in education brought by the pandemic.

"Yes, it is necessary for us [teachers] to adjust, we need to adjust on the capacity of today's children and with the situation as well."

Theme 2: Dare to Teach: Agents of Learning, Frontliners of Teaching

The second theme, entitled *Dare to Teach: Agents of Learning, Front liners of Teaching*, emerged in the process of analysis. Five sub-concepts were identified under this theme: (1) confronted with fear and clamor in teaching during the pandemic, (2) torn between duties and sacrifices, (3) feelings of teachers towards teaching during pandemic, (4) anxiety of teachers with distance teaching and learning, (5) passion and dedication for teaching science. This theme talks about the challenges faced by the teachers in new normal learning. These educators dared to continue teaching behind the threats of the virus and confronted by the clamor of the parents towards distance learning. These teachers caught themselves in the middle of their priorities on their personal lives and the call of their duties as a teacher. They also shared their insights and feelings towards their role on the front line and shared how their passion and dedication to teaching acts upon them to face all the hurdles of being an agent of learning. *Leoncio* shared his concern regarding with teaching during their community was on a high-risk Covid-19 area:

"Regarding the health risk, since our modality is through module [modular modality], how can we face the children? Such... How can we face the parents since there is a fast transmission of the virus? Isn't it? Especially here in Pagbilao, Pagbilao belonged to the top four areas with a lot of Covid cases that time; yes, you're right, in Pagbilao. So, the challenge there is on how we would face [the people]."

Clara added that:

"Their [students'] parents are usually undergrad of elementary such as grade 2, grade 1 parents... it is difficult because there is no one that could teach

the children. However, another issue is that it is too strict in Kabulihan; they were strict to the rules up to the extent that they prohibit the teachers to enter there because they were afraid of Covid, that's why... during the first days [of school], it was difficult [for us] that even you want to go to the kids issues may arise, that's why we just sneak-out [there] Hehehe. Only those who will allow us"

Due to the dread of transmission of the virus, Ma'am *Clara* also shared her sacrifices to prevent the diffusion of Covid-19:

"...before we were staying at a boarding house. However, since it was strict [in the area] we transferred to the school; thus we were sleeping at school, we stayed there, we were there confined having our own food... which could last for few days for staying there."

Aside from the fear of being a carrier or being infected by the virus, they also faced complaints from the students' guardians. *Leoncio* narrated his experience as he encountered this problem:

"...there were parents who... who were bucking there... there was a parent who bucked [to the teachers]. I felt pity towards my co-teacher... my co-teachers who were all kind, I encountered it, and I get angry ... I was angry thus I preceded the parents, "Aren't you were the one who gave that time? You were the ones who gave that time, then what are you complaining about?" I told that to the parents. Yes, "We have an agreement, you signed into this, and then what else do you want to happen? Do you want it to change again?" See, he could not [talk], this is because I was in the frontline in the distribution of modules."

Aside from their worries about the virus, they faced more obstacles in the teaching processes especially with facilitating science experiments. As *Clara* shared her difficulties:

"As a science teacher, it is tough to teach in a situation where there is no face-to-face interaction among the learners, because in doing experiments for example the experiment written on the module, I already translated the instruction into Tagalog, and told them to send [to me] pictures of their outputs, but then they did not send picture."

Luz shared:

“In case of... we were in public [school] there were a lot of students who have no... no [internet] access. Thus for those [who have no internet connection] what I suggest was they could write their observations and then draw and color [the illustration of the written experiment] however, of course, I’m uncertain of whether they really accomplish it or not, hence at least they comply just like that... that is why the system right now is too hard, especially in our science subject, its fine for the other [subjects]. We are not like just like that [easy as other subjects in terms of activities]”

Luz also told her thoughts about teaching science:

"So for me, teaching [in this system] is not enough, because of... say, for example, we're [teaching] science eh. Right? Hahaha (laughing). Besides, you can just create a PowerPoint or videos of something like this, on chem [chemistry] second quarter is chemistry; there is mole concept [lesson] then, even chemical bonding, they can't grasp it immediately and if they get that, that's very basic or own research. It's as if, for me, it's not enough, as if for me it lacks [on content and knowledge being taught] but then, I cannot do anything about it."

Josette also stated that:

“...the rest, if I would rate myself [in terms of teaching], it seems, it seems I failed in terms of computation part [lessons in science with computations]. I modify it and limit it to my module, which I did not have... I was not able to give the details, especially on the topic ray diagram that is why I felt guilty that I have not able to teach [those parts].”

Behind these hurdles in teaching science during the pandemic, these teachers showed their passion and love for their job. As *Fe* said that:

“Of course, it is different [learning system] challenging but manageable. Yes, our love for teaching science is still there, that even [teaching] through chat, through text, through call, as long as you could still share what you needed to teach to the students, guiding them, especially those who were struggling in the new normal, like that.”

Theme 3: Facing New Variants of Students

Another theme comes to the fore from the experiences shared by the teachers; this theme was entitled *Facing New Variants of Students*. This theme was divided into two subtopics which are (1) teachers' dilemma with students' discipline and honesty (2) disconnected students. This theme contains how teachers describe their distant students. The emergence of learning deficiencies among the students challenged the teachers as they strive to keep students engaged in learning and their value of academic integrity. During distance learning, these educators encounter problems with their students. *Josette* shared her experience:

"That's one, when checking [the attendance], no one answered, and yet they are active there online. While I'm discussing we're holding class record or list of names, [I would ask] "okay you can read this?" no one will respond, it will just consume the time, then others will instantly chat "choppy choppy po" just like that, it's like "fine, okay choppy, choppy" then you will see them, active in TikTok hahaha (laughing) that's it"

Bearing the same issue *Luz* added:

"During the retrieval [of modules] because the modules provided by the DepEd have the key to correction, that's why you have to give additional tasks to the students. But they'll be incompletely returning [it to you] only some of those given to them will be completely answered."

Aside from the lack of interest shown by the students, *Leoncio* also experienced academic dishonesty among students:

"Okay, so of course one of the problems since... since it is a modular instruction, one of the greatest problems that we encountered is to... the learner's value of honesty. The learner's value of honesty. You know... After all, some students were creating their group chat to share their modules with their answers."

Theme 4: A Dose of Hope: Educators' Response to Learning Emergency

Through an in-depth analysis of the data collected, the theme *A Dose of Hope: Educators' Response to Learning Emergency*, unfolded from the five sub-themes under it, such as (1) Teachers' intervention to decrease the gap in today's learning system, (2) Localization of experiments, (3) Demystifying the complexity of science lessons, (4) Connecting the school, the

community and the society and (5) Motivator that drives learning. This theme highlights the teachers' response to all the problems brought by the new normal setup of education. Through teachers' different interventions, they make learning possible amid the health crisis. They bridge the school and the students by simplifying the lessons, creating localized activities, inspiring students by motivating them, and connecting the school, the community, and society hand-in-hand to bring hope in learning during the pandemic. These educators showed their dedication to teaching through their various interventions that answered those problems brought by the pandemic. *Leoncio* shared his experience in conducting projects for distance learning:

“I go... I even climb the mountain of... and under the heat of... of... Atimonan, yes you're right, we go there since we have a vehicle. What we are doing since I am in charge there, we have the lists of names of the students in a barangay or a sitio then they are the ones we will visit, we conduct mobile learning that we called SMILE, that's project SMILE-Student Mobilization Intervention for Learning and Enhancement.”

These teachers also maximize the use of technological advances in facilitating distance learning. *Josette* shared her experience:

“I found the same activity on the internet, a free online resource its Phet Colorado which that software was the one who manipulates, for example, a spring, they are moving the spring then I'll ask “Okay, for example, that's how to play the spring,” or I showed them in synchronous [class] then they could able to see... They would understand [the topic], and this was one of the challenges for me, and some was partially solved already.”

In addition to that, these teachers made science experiments still possible even with a lack of essential laboratory equipment. *Fe* talked about the high school experiments during new normal learning:

"Yes, it's still possible, they have activities and experiments, but then it will be done at their homes, but then, they have for example before I have a topic in grade 8 about the earthquake, so they used stones, water, for them to see what wave looks like if they will use big pale with water, stone or ruler, however, those activities like that came from the region, it became better since activities were simplified by them, like all the possible materials that

they could use [in the experiments] are available at their home thus localization of activities are done"

Leoncio also stated that:

“So when it comes to those laboratory [activities] and experiments, I told them we are going to use the localized, anything available at home, hence we, as the teachers what are we doing since there are worksheets, I am also thinking of laboratory activities where materials are available with them”

These educators also demystify lessons to help students unravel the complexity of the subject. Teacher *Fe* shared how she did this technique:

"Yes because it is necessary to understand children that they really can't... they cannot.. or most of them are not used to independent learning...they will experience difficulties [in learning] especially science since of course, the medium of the instruction is in English, even the construction of sentences is difficult on them, so that's why our job is to simplify the explanation."

To catch the learners' interests, these teachers boost their morale by motivating the students.

Leoncio shares his role as motivator:

“Yes, in times like that, you need to motivate them. I’m actually good at dealing with the students, not to brag about it, even the lazy ones and those struggling learners there can do [activities]. They may be pushing themselves, yes also when it comes to the delivery of lessons since [there are some] children who cannot cope up [with the lessons], we create; actually interventions for that.”

Reflective Resonance

Theme 1: 4A’s of New Normal: Accept, Arrange, Adjust, and Adapt. To further strengthen the themes, reflective resonance was done that presents available works of literature parallel to the generated theme. What works typically in face-to-face classes is not necessarily applicable in distance learning. This requires a transformation of most aspects of teaching and learning processes. However, the sudden shift of the educational system was too short for all, especially for the teachers who facilitate learning. Teachers must accept the situation in order for them to build the mindset of continuing education amidst the pandemic. After having that mindset,

preparation is essential to equip teachers with the necessary knowledge and skills needed in distance learning and provide them with concrete methodology in delivering the curriculum contents in new normal education (De Villa & Manalo, 2020).

A qualitative study by Arrieta et al. (2020) analyzed that upon the DepEd's decision of learning continuity, science teachers begin with an urgent personal school preparation for the school year 2020-2021 while waiting for direct instructions of DepEd. It has been mentioned in the study that the primary focus of teachers' preparations is on professional development and on improving the technological fluency used in teaching methods and learning management systems. This has been evident with the results of the current study where participants mentioned that they initially facilitated learning using their techniques and materials while waiting for the directives of the higher educational sectors. They attended various meetings for preparations and training to be familiar with the platforms and modalities used in the new normal setting.

According to Tanhueco-Tumapon (2020), the global crisis posed an immediate adaptation of teachers to the new normal learning. Since a circumstance like the pandemic is unpredictable, education must never put into halt, teachers showed flexibility and fortitude in dealing with the abrupt changes in the system of teaching and learning processes. Though no one could adjust easily, as stated by the participants, they gradually get used to the changes in their timeline, routine, and teaching strategies, thus progressively adjusting to the setting and providing rich learning to the students during the pandemic.

Theme 2: Dare to Teach: Agents of Learning, Frontliners of Teaching. In terms of curriculum content, because of the impact of Covid-19 on learning processes, there is a problem on whether the lessons of the subject would be integrated or reduced. In this case, Romano et al. (2012) as cited by Cahapay (2020), the solution is to decrease the number of class hours. However, the duration of discussions should still maximize the lessons' objectives and address the expected learning goal. Through this, learning outcomes could be assimilated into the curriculum; thus, teachers could derive an approach in teaching instructions. Based on the narratives of the science teachers, they applied modification and simplification of the lessons and activities in science to make the most of the timeframe of teaching the subject given in the school year. Their instructions were anchored as well with the MELCs that is viewed as the necessary scope to cover the subject's objectives in each year level in basic education.

Another challenge that a science teacher encounters during the new normal learning is how distant teacher performs laboratory tasks since it requires technical assistance and supervision from the facilitator (Arietta et al., 2020). This has been crucial to the teachers, especially in this subject that entails hands-on engagement among the learners to meet the objectives. Nevertheless, rural science teachers still face these challenges in the new normal learning. As stated by Lansangan and Gonzalez (2020), public school science teachers continue to empower learners even struggling in the new normal learning using their dedication and perseverance in teaching science.

Themes 3: Facing New Variants of Students. According to the study of Arietta et al. (2020) on understanding the experiences of science teachers in new normal learning, since the modality of new normal learning increases the chance of students to attempt cheating and commit plagiarism since teachers are distant from the learners. This is one of the issues raised regarding distance learning. The participants pointed out the same concern regarding the students' value of academic honesty and discipline in learning. Michael and Williams (2013) gave ways to maintain academic honesty in schools. According to them, students must be supplied with the learning resources to drive students in learning and avoid cheating. Another one was to increase students' awareness of the potential outcome of their choices in terms of any forms of penalty.

The DepEd admits an already expected issues on academic dishonesty, which is inevitable in the system of blended learning. In response to this problem, Adonis (2020) cites the DepEd Undersecretary for curriculum and instruction, Mr. Diosdado San Antonio, who asked the help of the guardians or any significant adults that in this home-based learning that they play a huge role in reinforcing the value of academic honesty within their child. Adonis (2020) also pointed out that an experienced teacher is knowledgeable enough to identify whether the outputs of the learner were indeed done by them or accomplished by someone else.

As indicated by Dhawan (2020), given that there are protocols imposed by DepEd regarding the students' participation, such as not obliging them to put their cameras on during virtual meetings, not forcing them to submit modules early on time, and not requiring them to master and answer all the prescribed activities accurately because of the limitations brought by the learning situation. These became a huge concern among the science teachers, unlike in face-to-face classes where classroom management could be easily addressed, teachers find it challenging to monitor the students in distance modality.

Theme 4: A Dose of Hope: Educators' Response to Learning Emergency. According to De Vera (2020), one of the integral parts of today's educational situation is to think of what is effective in teaching and how to facilitate it. Teachers must develop ideas that would promote meaningful learning even students are distant from the instructors and build activities that would still keep students engaged with the learning process. Teachers displayed their creativity and innovation in creating solutions that would answer the demands of the new normal learning system. The teachers organize everything and give light to the possibility of bridging the school to the students' locations despite the threats imposed by the COVID-19.

Some studies associate integrating technologies in facilitating science subjects to higher academic achievement among the learners. This helps teachers drive interest and promote productivity to the students compared to the traditional method of teaching (Nawzad et al., 2018). The science teachers embrace the use of the advances of information and communications technology through the utilization of new applications, media, and learning platforms that pave the way to meaningful learning despite the challenges of teaching in new normal learning.

The unforeseen learning emergency that shifted all systems from traditional to new normal setting become a gateway for teachers to go out of the box in finding solutions to the challenges posed by the pandemic (Arrieta et al., 2020). Since science experiments are difficult to conduct in distance learning, especially within the rural areas, laboratory experiments were still conducted through localization of the materials needed for the tasks, modifications of lessons that still corresponds to content standards, and discovery of online platforms that could serve as supplementary to instructional materials proved that learning must continue with these committed science teachers in educating students beyond the pandemic.

5. Conclusion

The findings of the study imply that rural science teachers have to equip themselves with the knowledge and skills needed in teaching in the new normal learning. Since teaching science involves hands-on and mind-on activities, which help in greater learning achievement in the subject, teachers prepared methods and strategies that will continue meaningful learning on science even in distance learning. They attended webinars, online training on using educational technologies and science software applications that would provide them with knowledge and competencies to efficiently teach in new normal learning. All these seminars and plenty of

meetings prepared them to face the challenges of distance teaching. Science teachers also emphasized that since the time duration of science subjects was lessened due to the limited and possible hours given to teach in distance learning, it affects the depth of the content that the teacher could cover. This was one of the major dilemmas of science teachers as they are teaching a complex subject; it cannot be taught in a single session, especially in distance learning. It is challenging for rural science teachers to grasp students' attention in learning through a modality away from the instructors. Factor such as overloading of science concepts and students cannot easily absorb scientific ideas makes science subjects less appreciated. Thus, it contributes to the fact that learners tend to give less attention to the subject. In addition to that, the circumstance made it difficult for teachers to keep learners engage with the activities and tasks to accomplish the subject.

The findings imply that the reduced amount of face-to-face guidance that the teachers can provide reduces the drive of students to learn science lessons. The science teachers' intervention to the problem they encountered in facilitating scientific experiments is conducting localized experiments. Localization pertains to the adoption of the curriculum following the local setting of the school; thus, the process of teaching and learning depends on the condition of the environment. It can meet the demands of learning science in a new normal setting by customizing the materials needed in teaching the subject. Using improvised materials in dealing with the experiments prescribed by the DepEd answered the limitations on laboratory tools and equipment amid the pandemic. This paves the way for teachers to become more creative and ingenious in optimizing the availability of the resources found in local communities integrated into learning. Given all these insights and implications, these findings contributed to a deeper understanding of the experiences of rural science teachers as they facilitate learning amidst the pandemic.

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Application of Task-Based Learning Module in Mathematics V

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Abstract

This study aimed to determine the effectiveness of the task-based learning module in Mathematics in improving the computational skills of Grade V Students. The study used descriptive-experimental research design focused on students' perception of the lesson structure, evaluation of the module, and its effectiveness in improving the computational skills of the students. Generally, the students perceived the structure of the module in terms of pre-task, task, and review as very well structured. Likewise, the findings showed the evaluation in terms of adaptability, clarity, validity, usability, and aesthetic value to a very great extent. The results also showed a significant difference in the pre-test and post-test scores of the students in computational skills in terms of problem solving, decision making, sequencing, algorithm formation, and quantitative measurement. However, no significant relationship was found between the perceived structure of the lesson and the mean scores of the students in computational skills. Moreover, the perceived evaluation of the module has no significant relations with the computational skills. The study recommends the use of task-based learning module in Mathematics following the structure of pre-task, task, and review to improve the computational skills of the students.

Keywords: *task-based learning module, pre-task, task, review, computational skills*

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1. Introduction

Mathematics is the subject that pupils perceived as challenging and hard at times (Gafoor & Kurukkan, 2016). For instance, some find difficulty in answering mathematical sentences or equations involving the four fundamental operations, especially multiplication and division, and even harder answering answer arithmetic questions. As a challenging subject for its nature, it became more challenging during the present situation with the absence of face to face instruction. Since the Philippine Department of Education (DepEd) extensively uses printed modular remote learning as one of its instructional methods, notwithstanding some disagreement, learning materials are beneficial for the knowledge adaption of different concepts that needs to be learned from the crafted Most Essential Learning Competencies. Students get a sense of personal responsibility as an outcome of modular learning, which enhances independent learning.

According to Talimodao and Madrigal (2021), learners' academic achievement increased as a result of modular learning regardless of the setting. However, the current situations led to even poor performance in the field of mathematics. For example, in the researcher-administered diagnostic test in Mathematics V and the pre-test in the Division Numeracy as directed by the Schools Division of Quezon resulted to the Mean Percentage Score of 47.6 and 44.5, respectively. The MPS are relatively lower than the 75.0 standard MPS set by the Division. These statistics on the achievement of the students clearly indicate a problem within the level of the computational skills of the learners. With the concept of teaching to produce the desired learning outcome (Salandanan, 2012), it is relatively clear that it must consist of well-planned tasks. Learning is the definitive goal and teaching then is a personal venture.

During the pandemic, students in the Philippines are used to learning modules as part of the continuity plan. According to Putra and Novita (2015), students may study independently using modules since they are provided many instructions that are simple to understand and follow the learning activities. These modules are usually referred to as task-based learning (TBL) where the tasks are sequenced. TBL is described as activities that engage learners in meaningful, goal-oriented dialogue to solve issues, complete projects, and reach choices (Ellis, 2003). The TBL lessons allow students to complete a task, which entice interest from the students. However, it entails effective communication and a defined objective that students are oriented to be achieved.

In the TBL process, the instructor starts the session by initiating the task. It is divided into three lesson structures: pre-task, task, and review. In the pre-task, the teacher introduces the task to the students and gets them excited. In task stage, the learners answer the given activities and the teacher serves as facilitator of the learning process. In the review stage, the aim is accuracy—reflecting on the completed task and analyzing it (Fithriani, 2018). The common examples of tasks include creating a presentation, solving mathematical issues, or answering computational inquiries.

In this study, the learning activities in Mathematics are provided to the students as part of the task-based teaching utilizing the learning module to address the requirement to improve students' mathematical performance. As such, this study aimed to determine the effectiveness of TBL module in improving the computational skills of Grade V students in Mathematics. Specifically, it aimed to evaluate the structure of the lesson in the TBL module in terms of pre-task, task, and review. It also evaluated the task-based learning module based on adaptability, clarity, validity, usability, and aesthetic value. During the implementation, it assessed the pretest and posttest mastery level of the student-respondents on computational skills in terms of problem-solving, decision-making, sequencing, algorithm formation, and quantitative measurement. For statistical inference, the study tested that significant difference between the pretest and posttest mastery level of the student-respondents on computational skills.

2. Literature Review

Math computation skills are usually introduced during the early elementary grades in the following order: addition, subtraction, multiplication, and then division (Harris, 2017). Teachers often reinforce math computation skills via games, timed tests, and drills. New learning builds upon prior knowledge and is continually dependent until students have mastered all four skills (Harris, 2017). This new learning extends as the learner progress in learning. Generally speaking, computations entail finding an answer to a problem via math or logic.

According to Villanueva and Gayoles (2019), teaching should not only provide one stimulus to pupils. Teachers need to use interactive techniques to present material interestingly and effectively instead of using a textbook only. Much more in improving the computational skills of the learners, there must be a lot of activities that the teachers have to provide in order to achieve the learning objectives and competencies. To this, learning modules are recommended.

According to Educational Technologies, JPGM (2020), the use of learning modules is characterized as the method for presenting lesson materials in a direct style, with a chapter-by-chapter guide and with the freedom to control the release of the material in each turn. It embraces the idea of “chunking” information and can contain all types of content, such as text, graphics, and multimedia and assessment tools. In the current situation where plenty of students find difficulty in learning due to available limited learning resources, Rahmawati et al. (2019) proposes the utilization of modules in learning and in presenting lessons. The use of modules in instruction caters to individual differences in learning and provides an avenue for active participation where students learn by doing since they are involved in the manipulation of the instructional materials (Bedaure, 2012). In addition, the goal of instruction and the shifting of different strategies, methods, and approaches is the transfer of learning (Cabardo, 2015). This happens when learning in one context or with one set of materials affects performance in another context or with other related materials.

One of the elements of an effective learning module is the task-based learning. According to Fithriani (2018), the task-based learning is a lesson structure where there is a method of sequencing activities in the lesson. It has three parts or stages, the pre-task, task, and review. These stages follow a sequence of activities that involve the students in learning which the goal is to arrive in completing the objectives of the lesson. According to Rapanta et al. (2020), the task-based instruction is characterized by activities that engage learners in meaningful, goal-oriented communication to solve problems, complete projects, and reach decisions.

When utilizing task-based learning, teachers have to ask their students to perform tasks that resemble authentic “real-life” situations (Lemmolo, 2020). This approach particularly challenges students who are used to a more traditional classroom. There are given tasks that ask more from the students than the mere understanding of the lesson. Accordingly, learners have different ways of learning the subject matter. Thus, providing tasks to the learners that are within their abilities is needed in order to make learning happens (Reyes et al., 2019). Task-based learning offers the student an opportunity to do exactly the tasks given to them. The activity reflects real life learning where learners focus on meaning (Bowen, 2020). The tasks that should be given to the learners must develop them holistically and they must be able to use the learning in real-life situations rather just being mere taught.

Theoretical Framework

This study was anchored on the theory of scaffolding, an education term that was first used in context by Psychologist and instruction designer, Jerome Bruner (1978) and can also be traced from Lev Vygotsky's study of Zone of Proximal Development (1978). The term scaffolding refers to a process in which teachers' model or demonstrate how to solve a problem, and then step back, offering support as needed (Spadafora & Downes, 2020). Bruner stated that what determines the level of intellectual development is the extent to which the child has been given appropriate instruction together with practice or experience.

Wood et al. (1976) highlighted six important factors in the structure of social interactions with peers in students' education, including recruitment, decrease in degrees of freedom, direction maintenance, marking critical characteristics, frustration control, and demonstration. When showing or 'modeling' a solution to a task, for instance, "the tutor is 'imitating' in idealized form an attempted solution tried (or thought to have been tried) by the tutee with the hope that the learner would subsequently 'imitate' it back in a more acceptable form." "The only behaviors students' copy are all those they could already execute quite effectively," (Wood et al., 1976 p. 99)

3. Methodology

3.1. Research Design

The study employed descriptive and quasi-experimental research with intact group, wherein a task-based learning module was used to test if there is an improved computational skills of the Grade V students in Mathematics. The design entails manipulating the parameter, quasi-experimental research removes the directionality issue. As it does not include random assignment to conditions, it does not solve the problem of potential confounders. As a result, quasi-experimental research has a better internal validity than correlational studies but a lower internal validity than actual experiments (Jhangiani et al., 2015).

3.2. Respondents of the Study

The participants of the study consisted of 35 Grade V-Emerald students of a public elementary school in a town in the Philippines. The study used cluster-sampling technique and included all the 35 learners enrolled in the class as students-respondents of the study. This is the only section in Grade V which consist of 16 male and 19 female students.

3.3. Research Instrument

The instruments used in the study are research-made tests, task-based learning module and evaluation tool.

Pretest and posttest. The pretest and posttest on computational skills in Mathematics are supported by table of specifications (TOS) anchored on the Most Essential Learning Competencies and PIVOT 4A Budget of Work during the second quarter identified by the Department of Education. The pre-test and posttest are composed of five mathematical word problems each that test the mastery level of the students on computational skills in the aspects of problem-solving, decision making, sequencing, algorithm formation, and quantitative measurement. The answers of the students were rated using a researcher-made rubric. The pre-test and posttest were content-validated by seven experts in the field of education composed of one Head Teacher, three Master Teachers and three Teachers, all in line with Mathematics.

Task-based learning module. The task-based learning module was anchored from the Curriculum Guide of the K-12 Curriculum Program and based on the Most Essential Learning Competencies identified by the Department of Education covering the topics on the second grading period, which are addition, subtraction, multiplication, and division of decimals, as well as, ratio and proportion. The module follows the pre-task, task, and review stages.

Evaluation tool. A survey instrument was constructed for module evaluation. It has two parts: part 1 describes the extent of appreciation of the students-respondents on the three parts of the learning module: pre-task, task, and review stage; and part 2 describes the evaluation of the task-based learning module based on adaptability, clarity, validity, usability, and aesthetic value. All the statements were rated using the 5-point Likert Scale.

3.4. Research Procedure

Pre-test. The administered pre-test on computational skills covered the lessons on the second grading period based on the Most Essential Learning Competencies (MELC) identified by the Department of Education. The parents of the participants received the pre-test materials and were given instructions on how to answer the test. After one week, the accomplished pre-tests were retrieved while the first set of task-based learning module was given.

Task-based learning module. The task-based learning module was given on the second week. The module on the addition of decimals was given first to the students which was answered within one week. On the following week, the parents submitted the first set of learning

module and received another one. The cycle went on for five learning weeks until all the lessons based on the ‘budget of work’ were given to the students which are addition, subtraction, multiplication, and division of decimals, and ratio and proportion.

Posttest. After the utilization of the task-based learning module, the posttest for the students’ computational skills that has the same learning competencies with the pre-test were given to the students-respondents. It was given to the parents during distribution schedule on the 7th week and retrieved on the 8th week of the second grading.

Module evaluation. The module evaluation instrument was given to the respondents on the 8th week. This evaluation assessed the students’ perception on the structure of the module.

Online monitoring, teacher-researcher’s written feedback on the module, and parents-teacher evaluation of students’ works after every quarter were done to monitor the progress of the student-respondents as they answer the module. Following the government standard health protocol, the parent of the learner received the instruments through the learning hubs or stations set by the school.

3.4. Statistical Treatment of Data

The data were gathered, tabulated, tallied, and they were interpreted through statistical method. In assessing the module, mean and standard deviation were used. To find-out the significant difference between the mean pre-test and mean posttest scores of the student-respondents, paired t-test were utilized. The significant relationship was calculated using Pearson Product-Moment Correlation were used.

4. Findings and Discussion

Table 1 shows the extent to how student-respondents described the structure of the lesson in the task-based learning module in terms of pre-task. The result of the study reveals that the student-respondents strongly agreed with all the statements on the criteria indicated with a general mean of 4.61. It implies that the structure of the pre-task in the task-based learning module is very well-structured.

Table 1*Perceived Structure of the Lesson in the Task-Based Learning Module*

Statements	Mean	SD	VI
Pre-Task			
<i>The pre-task stage of the Task-Based Learning module...</i>			
1. stated the expected learning outcomes	4.66	0.64	SA
2. had clearly explained the objectives	4.77	0.43	SA
3. provided instructions and materials that supported my study	4.83	0.45	SA
4. had an organized content	4.63	0.6	SA
5. stimulated my interest to proceed with the lesson	4.69	0.58	SA
6. made me understand the aims and requirements of the module from the introductory stage	4.71	0.52	SA
7. provided sufficient background information	4.66	0.59	SA
8. used ideas and representations that are familiar to me	4.74	0.56	SA
9. increased my confidence in carrying out the task	4.8	0.47	SA
10. encouraged me to conduct independent work	4.6	0.65	SA
Overall	4.71	0.46	SA
Task			
<i>The task stage of the Task-Based Learning module...</i>			
1. presented situations and ideas that are factual	4.66	0.64	SA
2. supplied materials that support my study	4.71	0.62	SA
3. had activities that are within my level of understanding	4.63	0.65	SA
4. presented topics in an appropriate order	4.63	0.73	SA
5. is suitable for independent work	4.57	0.74	SA
6. provided explanation to guide my learning	4.69	0.68	SA
7. has appropriate content	4.69	0.63	SA
8. gave activities in preparation for assessment	4.54	0.7	SA
Statements	Mean	SD	VI
9. paced the lesson to meet student needs	4.54	0.7	SA
10. enabled me to feel enthusiastic in completing the tasks	4.66	0.64	SA
Overall	4.63	0.58	SA
Review			
<i>The review stage of the Task-Based Learning module...</i>			
1. has organized supplemental activities	4.69	0.58	SA
2. provided learning tasks that support my understanding of the lesson	4.77	0.49	SA
3. helped increase my knowledge of the discipline	4.86	0.43	SA
4. probed for clarification and understanding	4.71	0.52	SA
5. created support (scaffolding) to make it easier to understand the lesson	4.69	0.58	SA
6. made connections between and among ideas	4.66	0.59	SA
7. provided independent thinking at the end of the lesson	4.6	0.69	SA
8. have met the learning outcomes	4.51	0.78	SA
9. made me excited to proceed to the next lesson	4.6	0.65	SA
10. helped me in understanding the lesson at a higher level	4.6	0.6	SA
Overall	4.67	0.48	SA

Legend: 4.50-5.00 Strongly Agree/ Very Well Structured, 3.50-4.49 Agree/ Well Structured, 2.50-3.49 Moderately Agree/ Structured, 1.50-2.49 Disagree/ Not so Structured, 1.00-1.49 Strongly Disagree/ Not Structured

It points out that the construction stage where the objectives and topic are being introduced, and where engagement of the lesson is being done is highly appreciated by the respondents. It also shows that the pre-task stage was able to engage the learners to continue doing the task that the material presented to them. The result implicates that the structure of the lesson in the task-based learning module in terms of pre-task provides clear direction on the tasks to be performed by the students. It is similar to the established task of Belotti (2010) which provides activities that embody units of knowledge and with those activities comes learning that is important as children progress.

Moreover, the result also demonstrates the strong agreement of the student-respondents on the structure of the TBL module in terms of task with the overall mean of 4.63. This implies that the task stage of the lesson is very well-structured and the design of the task stage is highly acceptable. This is the exact explanation of Bowen (2010) that the task should reflect real-life learning where learners focus on meaning.

In terms of review, the student-respondents strongly agreed on the indicators with a general mean of 4.67. This means that they viewed the particular stage of the learning module as very well-structured and constructed in accordance with the preference and ability of the students. This compensates the consideration of McLeod (2008) that the learner's material must fit their learning style or ability.

In summary, the structure of the TBL module based on the student-respondents' description has been found to be very well-structured, and the way how the instructions, activities, and assessment were presented has been a significant factor why the students were able to progress in performing the tasks and understanding the lessons. The result is supported by Mitchell and Carbone (2011) which indicates that the structure of the task that students are carrying out will influence students' engagement with the lesson for them to understand fully the lessons included.

Table 2 presents the respondents' perception of the module based on various indicators. In terms of adaptability, the results showed a grand mean of 4.63 that depicts strong agreement. It implies that they evaluated the learning module based on its adaptability to the very great extent. Moreover, the task-based learning module is highly adaptable or has a quality of being able to adjust to new conditions or the capacity to be modified for a new use or purpose.

Table 2*Perception on Task-Based Learning Module*

Statements	Mean	SD	VI
Adaptability			
<i>The module</i>			
1. is suitable for distance learning modality	4.54	0.66	SA
2. can be adapted to respond to the needs, interests and goal of the learners	4.54	0.61	SA
3. is aligned to Grade V level	4.74	0.56	SA
4. is appropriate to the different types of learners	4.74	0.51	SA
5. consists of current and relevant ideas	4.57	0.61	SA
Overall	4.63	0.49	SA
Clarity			
<i>The module...</i>			
1. has clear direction on how to answer	4.66	0.64	SA
2. is self- directed that students can follow the given directions in answering	4.6	0.69	SA
3. clearly emphasizes completing tasks	4.49	0.74	A
4. has clear learning objectives	4.6	0.65	SA
5. presents information in appealing and clear ways	4.54	0.61	SA
Overall	4.58	0.61	SA
Validity			
<i>The module...</i>			
1. presents opportunities for task-based learning	4.51	0.7	SA
2. primarily considers the students' needs and interests	4.51	0.7	SA
3. gives factual ideas and information throughout the lesson	4.66	0.64	SA
4. relies on the learners' prior knowledge for building new skills	4.57	0.65	SA
5. is aligned to the learning competencies	4.63	0.69	SA
Overall	4.58	0.62	SA
Usability			
<i>the module</i>			
1. is answerable for learners regardless of intellectual ability	4.6	0.69	SA
2. is designed so that learners can immediately apply the skills and knowledge acquired	4.49	0.7	A
3. provides opportunity for learners to apply what they have learned in authentic situations	4.57	0.61	SA
4. sets up so that learners can advance at their own pace	4.51	0.61	SA
5. is convenient to use with regards to the new normal setting	4.57	0.61	SA
Overall	4.55	0.57	SA
Aesthetic Value			
<i>the module</i>			
1. has texts are big enough to be read by students	4.83	0.45	SA
2. has decluttered lay out which is not intimidating	4.69	0.58	SA
3. breaks up the texts through visuals and helps the reader to understand it	4.69	0.58	SA
4. is attractive to the learners	4.71	0.52	SA
5. looks easy to read and understand	4.69	0.53	SA
Overall	4.72	0.38	SA

Legend: 4.50-5.00 Strongly Agree/ Very Great Extent, 3.50-4.49 Agree/ Great Extent, 2.50-3.49 Moderately Agree/ Moderate Extent, 1.50-2.49 Disagree/ Some Extent, 1.00-1.49 Strongly Disagree/ Not At all

It infers that the developed and contextualized learning module can be more adaptable. This adaptable feature of the module as reiterated by Ambrose et al. (2013) can help lead students toward self-sufficiency and lifelong advancement.

In terms of clarity, the grand mean yields a strong agreement with the mean of 4.58. The students perceived it to be at very great extent based on clarity. It denotes that the respondents clearly understand the contexts of the lesson presented in the task-based learning module. Moreover, it can be inferred that the students perceived the module to be clear leading to the understanding of the module content. The result fits the same evaluation of Khalil and Elkhider (2016) that TBL module uses clear instructional design.

In terms of validity, result shows that students strongly agreed that the module is valid after garnering the grand mean of 4.58. It signifies that the module has the quality or state of being valid and fact-based, appropriate to measure what it intends to measure and suitable to be used considering the factors that affect how they learn during the modular distance learning. This is similar to the description of Buntins et al. (2017) that validity is met when skills have been measured well and developed to what the learning outcomes have been met.

In terms of usability, there is strong agreement to the indicators with an average mean of 4.55 denoting usability at the very great extent. The developed TBL module is capable of being used in the distant learning modality. Moreover, the evaluation also fits the criteria of Garin et al. (2016) on the designed objectives, instructions, and activities that allow learners to explore ahead and discover new solutions to the problem.

There is also strong agreement on the aesthetic value of the module as evidenced by an overall mean of 4.72. The learning module appearance provided positive effects on how the students see the module as a material that aids the achievement of their learning goals. Similarly, the description of Duh and Krašna (2011) that aesthetic value does not only pertain on its appearance but also with the natural concept used in presenting the lesson to make it more relevant. True enough, the aesthetic value of the material also affects the attitude of the learners using it.

Table 3 shows the students' performance on the pretest and posttests involving computational skills such as problem-solving, decision-making, sequencing, algorithm formation and quantitative measurement. Overall, the students had extremely better performance in the posttest signifying a positive effect on the students after the implementation of the TBL module. From the low level of achievement on the pretest, the students obtained very good to excellent performances in problem-solving, decision-making, sequencing, algorithm formation and

quantitative measurement. This result affirms the findings of Putra and Novita (2015), Ellis (2003), Fithriani (2018), Rapanta et al. (2020), Lemmolo (2020) and Reyes et al. (2019) that TBL module improves students' performance.

The results show that during the pre-test no respondent was able to perform excellently in problem solving. However, 25 students obtained a score of 16-20, which corresponds to 71.4% interpreted as very good. It indicates that most of the students select the solution that is the most effective for overcoming the obstacle or constraint but does not completely explain why it is the most effective of the possible solutions.

Table 3

Pre-test and Posttest Scores on Computational Skills

Problem-Solving						Decision-Making					
Scores	Pre-test		Posttest		Remarks	Scores	Pretest		Posttest		Remarks
	F	%	F	%			F	%	F	%	
21-25	-	-	31	88.6	Excellent	21-25	-	-	32	91.4	Excellent
16-20	25	71.4	4	11.4	Very Good	16-20	23	65.7	3	8.6	Very Good
11-15	6	17.1	-	-	Good	11-15	6	17.1	-	-	Good
6-10	4	11.4	-	-	Fair	6-10	5	14.3	-	-	Fair
0-5	-	-	-	-	Poor	0-5	1	2.9	-	-	Poor

Sequencing						Algorithm Formation					
Scores	Pre-test		Posttest		Remarks	Scores	Pre-test		Posttest		Remarks
	F	%	F	%			F	%	F	%	
21-25	-	-	32	91.4	Excellent	21-25	-	-	31	88.6	Excellent
16-20	21	60	3	8.6	Very Good	16-20	22	62.9	4	11.4	Very Good
11-15	8	22.9	-	-	Good	11-15	7	20	-	-	Good
6-10	5	14.3	-	-	Fair	6-10	5	14.3	-	-	Fair
0-5	1	2.9	-	-	Poor	0-5	1	2.9	-	-	Poor

Quantitative Measurement					
Scores	Pre-test		Posttest		Remarks
	F	%	F	%	
21-25	-	-	32	91.4	Excellent
16-20	23	65.7	3	8.6	Very Good
11-15	6	17.1	-	-	Good
6-10	5	14.3	-	-	Fair
0-5	1	2.9	-	-	Poor

In terms of decision making, the pretest results infer that more than half of the respondents obtained scores at 16-20 bracket with 23 students in total comprising 65.7% rated as very good in decision making. The result shows that majority of the learners during the pre-test used relevant criteria to select the most appropriate option but does not completely explain why the option selected is the most appropriate.

As to the frequency of sequencing, no student received a score from 21-25 during the pretest. However, 21 or 60% of the respondents scored at 16-20 equivalent to very good performance in answering the mathematical word problems. In this test, most of the students can organize simple sequences sets with assistance to reveal patterns that suggest relationships. Similarly, none of the students did excellently in forming the algorithm during the pretest. There are 22 out of 35 students performed at very good level score of 16-20 comprising 62.9% of the respondents. This points out that students have created, generated or used symbols, with assistance, to form simple algorithms to compare alternative solutions to a computational problem.

In terms of quantitative measurement, still no student was able to meet the excellent scores of 21-25 during the pretest. However, there are 23 students or 65.7% at a very good level. The score of 16-20 implies the ability to describe or measure quantities such as number of blocks, number of moves and time to address spatial questions and problems.

Table 4

Test of Significant Difference between the Pre-test and Posttest Scores on Computational Skills

Computational Skills	Test	Mean	SD	Paired Differences				t	Sig
						95% CI of the Diff.			
				Mean	SD	Lower	Upper		
Problem Solving	Pretest	16.89	4.07						
	Posttest	23.80	2.08	6.91	3.58	5.683	8.145	11.413	0.000
Decision Making	Pretest	15.89	4.48						
	Posttest	23.20	2.34	7.31	3.77	6.019	8.610	11.474	0.000
Sequencing	Pretest	15.69	4.40						
	Posttest	23.40	2.37	7.71	3.50	6.511	8.918	13.029	0.000
Algorithm Formation	Pretest	15.06	4.45						
	Posttest	23.20	2.32	8.14	3.90	6.802	9.484	12.339	0.000
Quantitative Measurement	Pretest	15.60	4.47						
	Posttest	23.91	1.95	8.31	4.00	6.941	9.688	12.302	0.000

Table 4 presents a significant difference between the pre-test and posttest mastery levels on computational skills in terms of problem solving, decision making, sequencing, algorithm formation, and quantitative measurement. After utilizing the TBL module, students were able to improve their computational skills. Additionally, they were able to reach the excellent level in the mastery of their skills to select the solution that is the most effective in solving the problem, determine the most appropriate option in answering the question, identify the sequences and patterns, generate and use symbols, and measure data in the form of numbers. The quantitative measurement skill garnered the highest mean difference of 8.31. This entails that among the five

skills, this most developed enabled the students to advance their ability to describe, measure or estimate quantities. While the problem-solving skills gained the lowest mean difference of 6.91, it is sufficient to show that students were able to select the solution that is the most effective in solving the problem. This result affirms the studies of Putra and Novita (2015), Ellis (2003), Fithriani (2018), Rapanta et al. (2020), Lemmolo (2020) and Reyes et al. (2019).

5. Conclusion

The main objective of this study was to determine the effectiveness of the task-based learning module in Mathematics V in improving the computational skills of the students. In addition, it examined any significant difference between the mean pre-test and posttest mastery levels of the students on computational skills. The study employed descriptive and quasi-experimental research designs where a TBL module was developed and used as the primary instrument in improving the computational skills of the students.

Results of the module evaluation showed the TBL lesson as very well structured as evidenced by the obtained average means on pre-task (4.71), task (4.73), review (4.67) and a grand mean of 4.67 describing the module adaptable, clear, valid, usable, and aesthetically made. The students' performance also showed significant improvement from pretest to posttest. The posttest scores posted significantly higher scores in all five learning skills, an average of 32 students or 91% of the whole population is considered excellent, while the remaining 3 students or 9% is very good. The result showed significant difference between the pre-test and posttest scores on computational skills of the students resulting to affirmation that TBL module had been an effective tool in improving the computational skills of the students.

This study suggests that teachers may construct TBL module with directions that are precise and appropriate for the students to perform the tasks properly. Teachers are likewise encouraged to use the TBL module in teaching Mathematics as it was found to be significant in improving the computational skills of the students. Future researches are encouraged to conduct a similar study both in Mathematics and other disciplines using the same variables or input additional variables to expand the scope of the study.

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Effects of Reflective Learning Resource Material on Achievement of Mathematics Learning Outcome

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Abstract

This study developed and used a Reflective Learning Resource Material in Grade 9 Mathematics in effort to improve the performance learning outcome. It aimed to determine the effect of the developed learning resource material to the learning outcome in terms of analysis, representation and problem-solving skills. The study used descriptive research design utilizing the pretest/ posttest assessments and survey questionnaire as the main instruments, with 35 Grade 9 students during the school year 2020-2021 as participants of the study. The results revealed that reflective learning resource material is highly effective in the achievement of the Mathematics learning outcome. Further data resulted to a significant difference and an increased Mathematics learning outcome assessment on analysis, representation, and problem-solving skills implying that the use of reflective learning resource material helped the students improve their Mathematics skills. From lower proficiency levels, learners were able to reach advanced and proficient levels, indicating mastery of the competencies. This demonstrates the use of RLRM has a good significant relationship with mathematical skills development. The results suggest that incorporating reflective learning resource material into students' learning activities can improve Mathematics learning outcome.

Keywords: *reflective learning resource material, mathematics learning outcome, analysis, representation, problem-solving skills*

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1. Introduction

Students' mathematics performance is directly affected by changes in the educational framework and implementation process (Moreno-Guerrero et al., 2020). As such, teachers should help students connect their mathematical awareness, talents, and understandings to other topics and the world around them by assisting them in discovering, sharing, and engaging with them (Victoria State Government, 2019). Because mathematics education is an active, complex, and ongoing process, classroom activities in particular aid students in improving their thinking skills, thinking logically, systematically, objectively, and thoroughly, and adopting an objective and open attitude when dealing with problems (Su et al., 2016). For example, problem-solving abilities enable pupils to think creatively and critically using progressive and exciting mental processes (Yuanita et al., 2018). However, this is not always the case. Students face challenges in the learning process resulting to poor achievement.

According to the 2018 Programme for International Student Assessment (PISA) results, the Philippines scored 353 points in math literacy, which is lower than the global average of 489 points with only 19% of students accomplished Level 2 or higher in Mathematics. This result demonstrated the "*urgency of resolving problems and inequalities in attaining quality basic education in the country*" (Dela Cruz, 2019). In the school level results, one national high school in the Quezon province in the Philippines has a Mathematics MPS of 54.87%, of which, Mathematics 9 got 53.97% as the lowest MPS in all subjects in the same grade level in school year 2018-2019. These data proved the MPS below the standard passing rate of 75% signifying learners' difficulties in understanding the lesson.

The poor performance in mathematics has been severely affected by the pandemic situation due to the implementation of the modular distance learning modality (Castroverde & Acala, 2021). Dangle and Sumaoang (2020) identified lack of funding in the design and delivery of modules, students' difficulties with self-study, and parents' lack of knowledge on how to aid their child/children academically as the three main barriers in the modular distance learning. Despite the present educational crises, teachers are still finding strategies to reach all types of learners. The role of the instructor is crucial in supporting pupils in overcoming learning challenges (Dayagbil et al., 2021).

According to Hendriana (2017), innovative mathematical learning materials should provide students the mechanisms to explore their abilities. As the learning materials determines

students' success in understanding the lessons contained (Widodo & Jasmadi, 2008), it should provide evaluation and response to evaluation (Prastowo, 2012) and reflection of students on the learning process (Hendriana, 2019). Student reflection can be used to promote and assess the proficiencies as well as mathematical concepts (Attard, 2017). This allows students to become independent learners specially during the period of modular distance learning.

This study determines the effects of the reflective learning resource material on students' performance in mathematics 9. It also assessed the students' perception on the reflective learning resource material, experimented on the students' performance through pretest and posttest on analysis, representation, and problem-solving skills and tested significant difference on the pretest and posttest scores and significant relationship between the evaluation of the reflective learning material and performance in Mathematics.

2. Literature Review

2.1. Reflective Learning

Reflection process can be scaffold and encouraged to facilitate reflection, professional learning, and reflective practice (Hegarty, 2011). According to Mcleod (2017), reflective learning helps students to enable prior knowledge as well as build and rebuild their knowledge. In this process, the students learn from their own experiences, acquire metacognitive skills, take responsibility for their own learning, and increase their capacity to restructure and reframe information. On the teacher's perspectives, reflective learning enables teachers understand what areas must be improved and changed for better learning outcomes (Orias, 2019).

The most common method of reflective teaching includes journal writing and situational testing where students feed backs are assessed. According to Disilio (2019), reflective journals resulted in higher mean test scores, more complicated mathematical explanations, and more use of content-specific academic language. Similarly, Dionisio (2019) found that math journal helped the students' attitudes, increased their confidence and sharpened their Mathematical skills. Denton (2018) also found in a study that reflective learning journal helped students control negative feelings (such as anxiety and disappointment) that may occur when taking a difficult course.

According to Costa and Kallick (2020), reflection has several different aspects. It involves linking a current experience to previous learning (a process called scaffolding), gathering cognitive and emotional information from a variety of sensory inputs and applying what have been learned to different situations. Previous studies showed the usefulness of journal writing as a reflection

tool in face-to-face math courses. It was suggested to use online tools as well as several instructional strategies, to support reflective journaling in learning environments in Mathematics. This includes anything from open-ended and generic self-reflection exercises to more content-specific, forced-choice assessments (Choi et al., 2017).

2.2 Students' Performance in Mathematics

According to Villamis (2020), learning outcomes are instances of the fundamental experience, abilities, or mastery acquired by the student because of a learning action. These are quantifiable triumphs that students really need to understand after the learning is done. In terms of Mathematics, the required learning outcomes include analysis, representation, and problem solving skills.

Analysis. According to Indriati et al. (2020), analytical skills is a deduction capacity to help people in solving problems of Mathematics. Ariyanto (2020) adds analyzing as the process of breaking down a material into its fundamental bits and discovering how the parts interact with one another and with a broader structure or purpose, especially in the numerical sense. Students require the ability to think analytically because the objects studied in mathematics are abstract (Khusna, 2020). At the analyze level, students must not only be able to apply one theory, but also a number of related ideas. Differentiating, organizing, and characterizing are the three degrees of analysis (Ariyanto, 2020).

Representation. According to Minarni et al. (2016), mathematical representation can be divided into two types: visual and non-visual. Non-visual representations include numerical representations and mathematical equations or mathematical models, as well as graphs, tables, sketches/figures, and diagrams. When visual and numerical representations are used in ratio, proportion, and percent problems, the power of representation is clearly visible. In addition, Widakdo et al. (2017) affirms that representation is the most basic way for people to comprehend mathematical concepts particularly constructing abstract ideas into concrete ideas using logical thinking through configuration of signs, characters, or objects. For instance, Utami et al. (2019) asserted that mathematical representation is necessary in solving geometry problems.

Problem-Solving Skills. The major reason for teaching mathematics is to equip students to address challenges in everyday life (Phonapichat et al., 2014). Problem solving skills is the capacity or key ability of the students in comprehension, choosing approaches and adapting

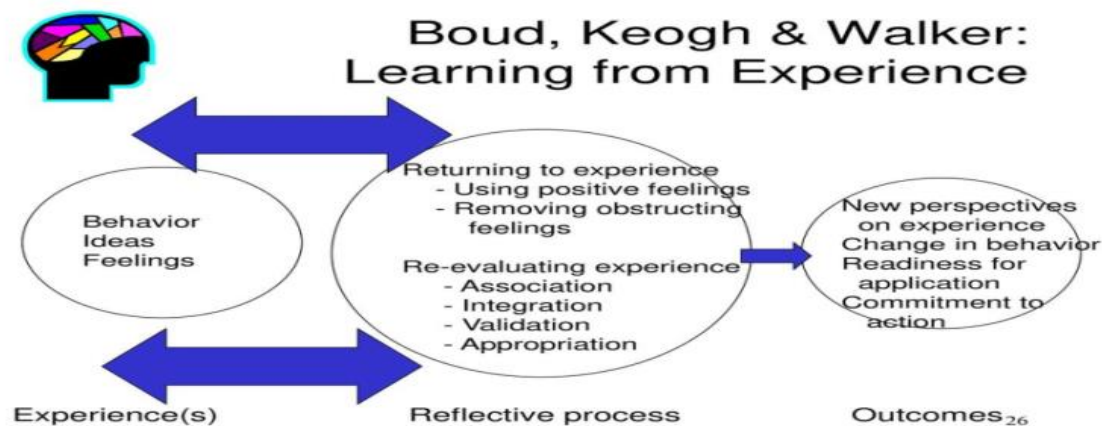
procedures to discover the arrangement of an issue (Surya et al., 2017). It is a vital fundamental ability that includes different cycles such as investigating, deciphering, thinking, anticipating, assessing, and reflecting (Anderson, 2009). Mathematical problem-solving skills are not only a goal in math education, but also something that is important in everyday life (Pinter, 2012). According to Simamora et al. (2019), it is normal that Mathematics teachers work with students learning materials.

2.2. Theoretical Framework

This study is guided by the theory model of Boud, Keogh, and Walker (1985) on learning from experience as shown in Figure 1.

Figure 1

The Learning from Experience Model



Source: Boud, Keogh & Walker (1985) entitled Learning from experience.

The three basic stages of the reflective process according to Boud et al. (1985) are depicted in the theoretical model. Returning to experience, reliving the underlying engagement in the student's mind, or communicating the experience's highlights to others are all examples of returning to experience. Using pleasant sensations and reducing blocking sentiments are the two aspects of attending to feelings. Focusing on pleasant sentiments regarding learning and the event under examination is what the usage of positive feelings implies. This might include intentionally recalling happy experiences, focusing on positive features of one's present environment, or anticipating the possible advantages of event processing. The removal of blocking experience is a

necessary precursor to an objective cognition of events. It entails doing everything possible to remove roadblocks to a full analysis of the event.

This leads to the third phase of re-evaluating experience, which is important but sometimes ignored if the prior two are skipped. Any sort of evaluation might have happened at any point during the process, and the learner may have accepted it as part of the experience. Re-evaluation entails re-evaluating experience in light of the student's goals, linking new data to previously collected data, and incorporating new knowledge into the student's reasonable context. It increases the student's allocation of this information to their behavior collection. This might involve a mental rehearsal in which the new information is put to the test to determine its validity, as well as the planning of following actions in which the knowledge is put to use in one's life. Even if these components and phases have separated from one another, they cannot be considered independent and unrelated. All in all, the technique will follow the means we have illustrated, however there might be a few cycles between stages, reiterations of key components, and waiting over particularly significant components (Boud et al., 1985).

3. Methodology

The study employed descriptive research method that attempted to describe and analyze the impact of reflective learning resource material on student's performance in Mathematics 9. This research approach focuses on the effectiveness of reflective learning resource material.

This study utilized cluster sampling technique in choosing one class section as respondents out of the four sections of Grade 9 students in a national high school with a total population of 147. The chosen respondents were those who share characteristics that are indicative of the entire population. Since Grade 9 student population was too high to test the entire population in a short period of time with minimal financial resources, the study chose the Grade 9 section Cattleya consisted of 35 students as the samples. There were 27 girls and 18 boys who participated the study.

This study used researcher-developed instruments for data gathering. The three instruments used were reflective learning resource material, pretest/posttest, and survey questionnaire on experience reflection of the students.

Reflective learning material. In the development of the reflective learning resource, the design step was anchored on the ICARE model as enumerated by Hidayat (2017). It has five key

elements of learning experience from children and adult that is introduction, connection, application, reflection and extension. It was intended only for the Quarter 2 lessons which include variations, integral and zero exponents, rational exponent and radical expressions, simplifying radical expressions, operations on radical and radical equations. It also includes the Most Essential Learning Competencies (MELC) and specific objectives of the lesson. Students' learning was aided by the Math journal templates that prompts children to coordinate, explain, and focus on their thinking in order to put their thoughts on paper. A variety of exercises were also provided so that learners could practice their skills from the most basic to the most complex. Every class session ended with a reflective learning activity that allowed students to reflect on their own learning and apply what they had learned in a real-world scenario.

Pretest and Posttest. The pretest and posttest are accompanied by table of specification dependent on the targets of the exercises. These two tests contain every topic for the quarter 2 in line with the curriculum's goal, MELC and the contents required by the DepEd's self-learning module. Equal weight and allocation were assigned to analysis, representation, and problem-solving skills in both the tests. The tests were content-validated by specialists including editorial manager for clarity, comprehensiveness, sentence structure and substance. Important adjustments were made such as reconstruction of stem of each test item and regrouping of test item based from specific Mathematics performance indicators, reasonable things held and a few things were altered and reexamined. The approved test was directed to Grade 9 students. The tests contain 40 items.

Survey Questionnaire. The study also utilized researcher-made survey questionnaire to determine the extent of the impact of the reflective learning resource material. This contains six indicators with five statements each rated with 5-scale Likert style checklist.

The data gathering process involves the administration of the tests and survey on the evaluation of the learning material.

Administration of the pretest. The pretest was given to the students before the actual use of the developed reflective learning material. It was distributed to the students on the first day of second quarter of School Year 2020-2021. Since the learners are in modular modality, the pretest was disseminated during the first day of the module distribution schedule day. The pretest was returned after four days.

Administration of the posttest. The students used the learning resource material for six consecutive weeks as supplemental material in Mathematics. The posttest was administered on the 7th week and asked to return the exam with answers four days after.

Conduct of the survey. On the 8th week of the second quarter, the survey was conducted. The survey questionnaire was given to the students and explained to them the objectives.

The study utilized the following statistical techniques: mean and standard deviations, frequency count and percent distribution, paired t-test and Pearson-Product Moment Correlation.

4. Results and Discussion

Table 1 shows the overall evaluation of the students on their use of the reflective learning material as measured by positive feelings, obstructing feeling, association, integration, validation and appropriation.

Table 1

Students' Evaluation of the Reflective Learning Resource Material

Indicators	Mean	SD	VI
Positive Feelings	3.34	0.71	Agree
Obstructing Feelings	3.20	0.74	Agree
Association	3.27	0.64	Agree
Integration	3.33	0.67	Agree
Validation	3.35	0.68	Agree
Appropriation	3.37	0.67	Agree

Legend: 3.50-4.00- Strongly Agree, 2.50-3.49- Agree; 1.50-2.49 – Disagree; 1.00-1.49 – Strongly Disagree

Table 1 shows the evaluation of the students on the reflective learning resource material in terms of positive feelings, obstructing feelings, association, integration, validation and appropriation. Overall, the students' agreement on the indicators imply their positive appreciation of the material.

In terms of positive feelings, the students agreed with all the criteria indicating a general mean of 3.34. The agreement means the use of reflective learning resource material helped them achieve positive experiences through reflection writing and enabled them to use their positive emotions to better understand the lesson. This result agrees with the findings of Guce (2017) that providing opportunities for students to see how the process of writing can enrich their mathematical learning may lead to a positive feeling or fulfilment. Similarly, the students have common agreement in terms of obstructing feeling with an overall mean of 3.20. This also shows student-respondents had a great extent of experience in using the learning resource material. As reflected, journal writing and journal prompts assisted students in overcoming negative feelings

resulting to maintaining a positive attitude towards the topic. As a result, students have more chances to express themselves and generate new ideas enabling better understanding of the lessons.

In terms of experience as to association, the overall mean of 3.27 means students had a great extent of experience in relating ideas and feelings during initial experience to the present and previous knowledge and attitudes. Meanwhile, the other indicators were also rated “agree” including integration (M=3.33, SD = 0.67), validation (M=3.35, SD = 0.68) and appropriation (M=3.37, SD = 0.67). The reflective writing and activities provided in the learning resource material help students associate new learned concepts to its application in a real-life situation, finding solution and re-evaluating new experiences in a real-world setting.

Table 2

Pretest and Posttest Scores of the Students

Scores	Pretest		Posttest		Remarks
	F	%	F	%	
Analysis					
12-14	2	5.7	19	54.3	Advanced
9-11	6	17.1	6	17.1	Proficient
6-8	15	42.9	7	20	Approaching Proficiency
3-5	11	31.4	2	5.7	Developing
0-2	1	2.9	1	2.9	Beginning
Representation					
12-14	0	1	18	51.4	Advanced
9-11	3	8.6	11	31.4	Proficient
6-8	10	28.6	4	11.4	Approaching Proficiency
3-5	17	48.6	2	5.7	Developing
0-2	5	14.3	0	0	Beginning
Problem-Solving Skills					
12-14	1	2.9	8	22.9	Advanced
9-11	3	8.6	10	28.6	Proficient
6-8	11	31.4	13	37.1	Approaching Proficiency
3-5	18	51.4	4	11.4	Developing
0-2	2	5.7	0	0	Beginning

Table 2 shows the outcome of pretest and posttest of Grade 9 students. In terms of analysis, the majority of students' pre-test scores were 6-8 points, with the highest frequency of 15, 42.9% of

the respondents are approaching proficiency. In the developing level, there is a frequency of 11, which represents 31.4% of the respondents. It signifies that, prior to the implementation of the reflective learning resource material, students have an average performance in scrutinizing and breaking down facts to obtain better understanding of the lesson.

After the implementation of the learning resource material, most of the students in the class got a score of 12-14, interpreted as 'advanced' and 7 students fall under approaching proficiency level. This result implies that after the utilization of the reflective learning resource material, majority of the students were able to utilize their own strategy to clearly analyze each question and arrive with the correct answer. It also inferred that the students' analytical skills were revealed through the posttest, with majority of students demonstrating mastery of the important concepts of the lesson in such a way that they were able to examine and analyze the provided question and provide proper answers in each question. Their knowledge and opinions about the subject enabled them to appropriately analyze conditions, leading to the correct answers to the given question.

In terms of representation, no one performs exceptionally during the pretest. Students' representation skill involved the transformation of mathematical expressions into their equivalence form. The pre-test showed students within the approaching proficiency to developing level. This suggests that students had the bare minimum of knowledge, skills, and core understandings to rewrite mathematical concepts or expressions into their equivalent expressions. Moreover, the posttest showed that majority of the students are within proficient to advanced level. The use of the resource material exceeded the core requirements in terms of representing concepts in Mathematics.

In terms of problem-solving, majority of the students ranged from approaching proficiency to developing level during the pretest which means students were not able to visualize and examine the given information to solve the given problem. However, the posttest assessment result shows that majority of them were in proficient to approaching proficiency level. The learning material helped the students become more competitive in solving problems involving variation, integral exponents, and radical equations.

The results of the evaluation are congruent to the explanations of Guce (2017) that students enjoy sharing positive thoughts or emotions and eventually grasp the lessons more easily, Hernick and Jaworska (2018) that students' enjoyment has a good impact on the learning process and Kuuk and Arslan (2020) that journal writing and journal prompts assisted students in overcoming negative feelings. Similarly, the positive evaluation of the students on the reflective learning

resource leads to fruitful and enjoyable learning (McCoy, 2013), concern with the new knowledge (Williams, 2008), opportunity to correct tasks (Cowan, 2014), application to a real-world setting experience (Murillo-Llorente et al, 2021), finding solutions to a problem (Al-Rawahi & Al-Balushi, 2015), connections among concepts and experiences (Farrah, 2012), and group ideas according to level of understanding (Habibi et al., 2017).

Table 3

Test of Difference Between the Pretest and Posttest on the Dependent Variable

Mathematics Learning Outcome	Pretest		Posttest		T	Df	Sig.
	Mean	SD	Mean	SD			
Analysis	6.46	2.66	10.54	3.19	-7.591	34	.000
Representation	4.97	2.36	10.94	2.79	11.289	34	.000
Problem Solving Skills	5.69	2.23	8.69	2.71	-6.493	34	.000

Based from table 3, there is a significant difference between the pretest and posttest scores performances of the student respondents before and after the utilization of the reflective learning resource material with significance value of 0.000 in all Mathematics learning outcomes. There is a significant improvement in the performance of the students from developing and approaching proficiency levels to advanced level in analysis and representation. Meanwhile, student-respondents were able to reach approaching proficiency and proficient levels in problem-solving skills.

The statistical analysis proves that the learning material helped the learners improve their skills and eventually achieve the mathematics learning outcomes. Thus, this study concur with the findings of Guce (2017), Hernick and Jaworska (2018), Kuuk and Arslan (2020), McCoy (2013), Williams (2008), Cowan (2014), Murillo-Llorente et al. (2021), Al-Rawahi and Al-Balushi (2015), Farrah (2012) and Habibi et al. (2017) that the reflective learning material helps improve the students' performance in mathematics.

Table 4

Test of Significant Relationship Between the Evaluation of the Learning Resource Material and the Students' Mathematics Performance

Reflective Learning Resource Material	Mathematical Learning Outcomes		
	Analysis	Representation	Problem Solving Skills
Reflection through Experience			
Returning to Experience			
Using Positive Feelings	.421*	.306	.416*
Removing Obstructing Feelings	.031	.086	.109
Re-evaluate to Experience			
Association	.157	-.068	.073
Integration	.194	.048	.155
Validation	.278	.217	.386*
Appropriation	.257	.180	.187

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

Table 4 notes a significant relationship between the students' evaluation of the reflective learning material and their test performance results. The relationship exists from the use of positive feeling and analysis as a mathematical learning outcome with r-value of 0.421. Moreover, significant relationship exists from the use of positive feeling in answering the reflective learning resource material and the problem-solving skills as a mathematical learning outcome with r-value of 0.416. There is also significant relationship between the validation in re-evaluating the experience and the problem-solving skills as mathematical learning outcome with r-value of 0.386. These findings are congruent to the study of Viterbo (2019) that the utilization of more usable material like module is significantly related to the level of skills attainment of the learner in problem solving particularly in applying concepts. Similarly, the study of McCornick et al. (2012) asserts that writing self-reflection makes students more engaged in their schoolwork and achieve higher levels of academic proficiency.

5. Conclusion

This study assessed the effects of the reflective learning resource material on the achievement of the Mathematics 9 learning outcomes using descriptive and experimental research methods. It examined the extent to which student-respondents engaged in the use of the learning material. The students' performance was assessed through the pretest and posttest scores in analysis, representation, and problem-solving skills.

The results of the evaluation showed that students perceived positively the use of the reflective learning material in their study of mathematics. This implicates that the use of the reflective learning resource material aided them to highly engage in learning. Furthermore, the students reached proficient to advanced level in terms of analysis and representation and proficient to approaching proficiency in terms of problem-solving skills after employing the reflective learning resource material.

It is highly evident that the use of reflective learning resource material in Mathematics 9 increases the students' proficiency of the Mathematics learning outcomes. Thus, the teachers could use the reflective learning resource material in the learning process. Furthermore, the incorporation of reflective learning resource material into students' learning activities is suggested to improve their achievement of the math learning outcomes in terms of analysis, representation, and problem solving.

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Student Registration and Records Management Services towards Digitization

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Abstract

This study examined the extent of implementation of the Student Registration and Records Management Services as fundamental elements of the planned academic record digitization. Utilizing a descriptive-evaluative design, the simple random sampled respondents evaluated the services of the Student Registration and Records Management Office (SRRMO) with a researcher-made and face validated questionnaire. Analyzed through frequency and percentage distribution, weighted mean, Kruskal Wallis test for significant difference, Fisher's Exact Test and Kendall tau_b for significant relationship, results revealed that the majority of the respondents moderately felt the problems encountered with the SRRMO services specifically on lack of admission requirements and non-observance of enrolment schedule. Therefore, the researcher recommends that a more accessible and convenient enrolment scheme be implemented in school. Hence, digitization of students' registration and records shall be instituted.

Keywords: *Students' Records, Evaluative Study, Digitization, SRRMO, DCLC*

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1. Introduction

Records management is one of the crucial facets of institutional progress (Yunus et al., 2016). No institution can survive without proper management of records of its activities (Seniwoliba et al., 2017). In the academic setting, records management mainly focus on school records. According to Nwadei (2018), school records include official documents, books and files that contains pertinent information of students, staff, teaching and learning records and school activities. It also includes school policies, educational laws, minutes of school– meetings, including information from the government, educational bodies, and other stakeholders pertaining to the growth and development of the school (Ololube, 2013). These records enable administrators to plan (Allahmagani, 2014) to make informed management decisions (Bibi, 2016). Any academic institution shall put forth efforts in attaining a centralized record management system that would respond to the various needs of the school's clientele, from enrolment to release of academic documents that provide salient information about the learners enrolled.

Academic institutions typically generate data in non-delimited files for use by various departments/units within the institution, with the same data appearing on multiple files. In this case, a simple address change would need to be processed twice, and possibly three or four times, depending on the number of other files that contain the data (Eludire, 2011). Incorrect course registration, late release of student results, inaccuracy due to manual and tedious calculation, and retrieval difficulties/inefficiency are all issues with student academic record management (Okumbor & Todo, 2020).

According to Ukaogba and Nwankwo (2020), an effective record management in academic institutions provides well-organized, properly stored and easily retrieved information. If the academic records are in place, the administrative tasks are easier and the records release services are faster and accurate. In addition, Nwaomah (2017) asserts that effective record management keeps administrative tasks easy. The benefit of school record is derived when information are properly managed through record management practices (Ukaogba & Nwankwo, 2020). Empirical evidence showed that records management had a significant impact on school administration (Charles, 2005) and promotes good governance (Matina & Ngulube, 2019).

Background of the Study

The Records Management Office is responsible for establishing and maintaining a framework of uniform recordkeeping application and practices, effective retention and disposal processes, and efficient storage and retrieval of records. It helps with school records, legal agreements, consulting, training, and archiving. The Dr. Carlos S. Lanting College Student Registration and Record Management Office (DCLC-SRRMO) records are the school's memory. These are vital assets for ongoing operations, providing valuable evidence of organization activities and transactions. As a private organization, DCLC-SRRMO is regularly evaluated. It records actions, transactions, and provides reliable evidence of authority decisions. In this context, accountability and transparency are essential. The scope of services of the Student Registration and Records Management Office covers a variety of activities from before students are admitted to the institution (e.g., design of class schedules) up until the students graduate (e.g., release of transcripts of records and other credentials). The services of the SRRMO apply to current and former undergraduate and graduate students of the Dr. Carlos S. Lanting College. The SRRMO currently employs manual process of records management and accepts only manual transactions.

The college had a significant number of students from the Basic Education Department to the School of Graduate Studies. From 4,205 in School Year (S.Y.) 2016-2017 to 3,346 in S.Y. 2017-2018 and 3,544 in S.Y. 2018-2019 in college. There is also increasing number of Senior High School students from 1,076 in S.Y. 2017-2018 to 1,965 in S.Y. 2018-2019, and 2,549 in S.Y. 2019-2020 and corresponding increase in graduates for three consecutive years, from 367 in S.Y. 2016-2017 to 377 in S.Y. 2017-2018 and 377 in S.Y. 2018-2019 in the college level. With the number of students who would opt to seek advice for possible enrolment and requests of the release of essential documents for whatever legal purposes these would serve them, it is high time to conduct a study that would respond to these calls. Consequently, evaluating the extent of implementation of the SRRMO services was an essential investigation that captured the authentic and genuine sources of information from which the school's clientele's perceptions on how effective and efficient its student record management system.

As such, this study determined the extent of implementation of Student Registration and Record Management at Dr. Carlos S. Lanting College for the S.Y. 2018-2019. It also identified

the problems encountered by the clients on the services provided. It tested the following hypotheses:

Ho1: There is no significant difference in the respondents' perceptions on the SRMO services when grouped according to their profile.

Ho2: There is no significant difference in the problems encountered by the respondents on the SRMO services when grouped according to their profile.

Ho3: There is no significant relationship between the respondents' perception on the SRMO services and the problems encountered.

2. Literature Review

According to Dada (2020), record is a brain box of information packaged in different formats that lives after the death of the creator from generation to generation. In most of the academic institutions, records come in various format from digital to hard copies and could be stored in physical or cloud-based spaces. The Queensland State Archives (2010) enumerates the record formats as to paper (reports, letters, memos, books, journals and diaries), roll (microfilm, microforms), photographs (prints, negatives, transparencies and x-ray films), sound recordings (disk or tape), moving images (film or video), electronic records and multimedia. School records are broadly classified into statutory and non- statutory records (Babalola et al., 2021). The statutory records are obligatory records produced on request while non-statutory records are additional documents which are not required by law (Amos, 2017). In record management, records must meet certain criteria such as confidentiality, proper maintenance, security, content preservation, and context (Akporhonor & Iwhiwhu, 2007; Uwaifo, 2004). These records, in whatever format, type and storage, are vital assets that must be properly managed. Effective record keeping is tantamount to effective management.

Records management leads to the achievement of organizational goals. Theoretical and empirical research show that good records management benefits institutions (AbuZawayda et al., 2013; Demirtel & Bayram, 2014; Mohammed et al., 2018; Mukred & Yusof, 2020). Such benefits include effective design (Yusof & Chell, 1999), planning (Atulomah, 2011), supervision and monitoring of programmes (Mabera, 2020), efficient financial management, a fair distribution of resources among all units, performance and educational needs of students, and better teaching and

learning facilities. Moreover, proper management may help concussed students recover faster and avoid academic damage (Carzoo et al., 2015). However, empirical research also identified many problems in institutional record management from the perspective of the main stakeholders (Awe, 2000; Egunleti, 2000; Oketunji, 2002; Utulu, 2001; Awe, 2000; Egunleti 2001; Utulu, 2001; Oketunji, 2002; Egwunyenga, 2005).

Recording activities are categorized into three major phases according to the records life cycle model: records creation & receipt, records use and maintenance and records disposition (Babalola, 2021). In this age and time, many colleges and universities still use the manual system of keeping records on paper. This records preservation methods were obsolete and records retrieval were slow and sometimes impossible (Ereh and Okon, 2015; Osakwe, 2011 and Umar, 2010). Due to the reliance on paper, student records may be lost or delayed. Paper records may also take up space and time to retrieve when needed. As a consequence, the absence of requisite records and records management apparatus have been shown to undermine accountability, task accomplishment and evaluation by school managers (Ibara, 2010).

As the use of computers and other information and communication technology infrastructure grows, so does the need for electronic records to improve productivity (Eze Asogwa, 2013). Organizations are now in a paperless era where all papers will fade (Gupta, 2015; Pfister & Schwabe, 2016). Converting existing or new paper records to electronic format is becoming an increasingly important issue for records management professionals (Leonard, 2011; Magsamen-Conrad & Checton, 2014).

Globally, Information and Communications Technology (ICT) has been welcomed for its enormous impact and contribution to numerous fields and sectors of the economy (Amutha, 2020; Babu & MA, 2018; Das, 2019). ICT has made significant contributions to education (Dotong et al., 2016; Saha et al., 2014) and student record management (Latif et al., 2008), as these sectors' efficiency and effectiveness have relied heavily on ICT, especially in the last three decades. These days, the use of ICT in student record management is seen as a boost to accuracy, timeliness, and professionalism (Minishi-Majanja, 2007). According to Toyo (2017), using ICT to manage students' records made report generation easier, faster, and more organized. Data sorting, amendment, security, and duplication were also addressed when ICT was introduced. These are not the only advantages of ICT, the use of ICT has benefited almost every aspect of human life

(Rusmansyah et al., 2018; Vestergaard, 2021) which made working much more enjoyable (Adisa et al., 2017; Satpathy et al., 2021).

According to Robek et al. (1995), “*an organization cannot control the growth of its records without a records management program*” which Keakopa (2013) and Shepherd et al. (2011) call for clearly defined policies and procedures to guide the implementation of record management programs but however, appear that most organizations have not developed the required frameworks.

3. Methodology

3.1. Research Design

This study utilized the descriptive-evaluative research method. This study was descriptive-evaluative since the result of the study evaluated the respondents' perceptions regarding the extent of implementation of the SRRMO. Evaluation research aims to provide information for decision-makers (policy-makers) related to a program's power or strength, seen from its effectiveness, cost, and device, among other factors (Ary et al., 2010).

3.2. Sample and Sampling Technique

This study involved the randomly-selected students of Dr. Carlos S. Lanting College across colleges and departments. Through simple random sampling via the snow ball technique, the researcher identified the number of students who were involved in this study from every college and department. Since all students have engaged with SRRMO services from enrolment to record release, a simple random sampling technique was necessarily undertaken as every student shares the same engagement unit with the services of the office.

After a series of data analyses and treatment, the researchers involved eighty-six (86) of the total number of respondents in this investigation. The respondents' profile showed that twenty (20) number students whose ages are below 18, fifty-three (53) of the age from 19 to 25 years of age, ten (10) are 26 to 30 years old, two (2) are 31 to 35 years old and only one (1) ages from 36 to 40 years old. The majority of the respondents' age ranges from 19 to 25, which means that they are in the right school age for college degrees enrolled. Additionally, fifty (50) of the respondents are male, and thirty-six (36) of them are female. In terms of course, majority of the respondents are equally distributed from the different courses and programs offered such as Bachelor of

Elementary Education, Bachelor in Secondary Education (major in Mathematics, English, and Filipino), Bachelor of Science in Computer Science, Bachelor of Science in Maritime Engineering, Bachelor of Science in Maritime Transportation, Bachelor of Science in Medical Laboratory Science, Bachelor of Science in Radiologic Technology, and Bachelor of Science in Nursing.

3.3. Data Gathering Process

This study employed online survey due to the restrictions imposed by the government during the pandemic. Using Google Form, the survey questionnaire was prepared and the link was sent to the participants. The survey was conducted for two weeks at the start of the S.Y.2020-2021 enrolment period. The link to the online survey form was sent to the participants' email. The participants were oriented on the general objective of the survey. It was clearly mentioned that the survey is consensual and that they have the freedom to refrain from answering at any part of the survey process. Meanwhile, the college has given permission to conduct the study and the data gathering and allowed the full disclosure of the college identity.

3.4. Data Analysis

The data gathered were treated using different statistical tools. For the profile of the respondents, simple frequency and percentage distribution was used. A weighted mean was used for the extent of implementation of the SRMO. Meanwhile, the Kruskal Wallis tested significant difference in the respondents' perceptions on the implementation of the services when grouped according to profile as well as the significant difference in the respondents' problems according to their profile. Fisher's Exact Test for Independence was used for the significant relationship on the respondents' perceptions regarding the extent of implementation of the services when grouped according to profile. Finally, the significant relationship between the perceptions of the respondents as regards the extent of implementation of the services and their problems encountered, Kendall Tau-B test for correlation was used.

4. Findings and Discussion

Based from Table 1, it can be noted that all the Key Result Areas (KRAs) of the SRRMO services were perceived to be 'Implemented'. This means that all the services within the expected outcomes of the office are perceived to have served the students' needs in terms of student recruitment (M=4.22), student admission (M=4.19), student record (M=4.16), student liaison/external assistance (M=4.10), and student academic record release (M=4.10).

Table 1

Perceptions of the Respondents on the Extent of Implementation of SRRMO Services

Key Results Areas of SRRMO	Weighted Mean	Interpretation
A. Student Record	4.16	Implemented
1. Organizes records properly and diligently	4.15	Implemented
2. Maintains accurate and complete data base of student record.	4.17	Implemented
3. Issues and collates student forms	4.06	Implemented
4. Updates student's database from submitted and returned enrollment documentation	4.08	Implemented
5. Inputs all student documents in the data base	4.07	Implemented
B. Student Admission	4.19	Implemented
1. Issues admission forms to students.	4.26	Highly implemented
2. Assists students in filing out of admission forms	4.22	Highly implemented
3. Manages the entire admission processes including data management and development from enrolment to graduation.	4.2	Implemented
4. Consults with the Dean/Head of the department where the student would opt to enroll ensuring the student meets the criteria set by the college for successful applicants.	4.33	Highly implemented
5. Undertake an annual review of the student admission process.	4.09	Implemented
C. Student Liaison/External Assistance	4.1	Implemented
1. Assists students' needs on external requirements that are to be submitted.	4.1	Implemented
2. Coordinates student room assignment and class schedules.	4.08	Implemented
3. Coordinates with Deans/Heads as to class scheduling and posting.	4.15	Implemented
4. Coordinate with Deans/Heads on lacking documents of the students both local and foreign	4.12	Implemented
5. Assists parents and other stakeholders visiting the SRRMO.	4	Implemented
D. Student Recruitment	4.22	Highly implemented
1. Conducts marketing schemes to invite students to enroll in school.	4.16	Implemented
2. Manages inquiries from prospect students	4.14	Implemented
3. Coordinates with Deans/Heads to conduct school visits, Open House Day and communication expos.	4.01	Implemented
4. Assists/Coordinates with the Deans/Heads on the screening of student documents.	4.14	Implemented
5. Orients students with the policies and regulations of school/institution.	4.35	Highly implemented
E. Student Academic Record Release	4.1	Implemented
1. Provides conducive holding area for students requesting their records to be released	4.17	Implemented
2. Attends to students/stakeholders needs and queries	4.06	Implemented
3. Provides viable access to students' records when asked	4.23	Highly implemented
4. Organizes record releasing process in an orderly manner.	4.31	Highly implemented
5. Releases students' records on its scheduled release given by the records in-charge	4.16	Implemented
General Weighted mean	4.156	Implemented

Legend: 4.21-5.00 (Highly implemented-HI), 3.41-4.20 (Implemented-I), 2.61-3.40 (Moderately Implemented-MI), 1.81-2.60 (Slightly Implemented-SI), 1.00-1.80 (Not Implemented-NI)

The 'Student Recruitment' (M=4.22) has high implementation and the most substantial of the KRA's of SRRMO. This can be attributed to the organized orientation with the policies and regulations of the programs and institutions that the school implements before regular classes

(M=4.35). The ‘Student academic records release’ (M=4.10) and ‘student liaison/external assistance’ (M=4.10) are the least KRA’s of SRRMO. This is an indication that coordination in regards to room assignment, class schedules, documents request and release, and stakeholders’ queries. These findings suggest that lack of appropriate policies and programs for recording and releasing of data electronically, indicating of the lack of IT infrastructure for the SRRMO. These are consistent with the studies of Pangcatan and Prado (2019), Yue (2011) and Wang (2010), which emphasized the critical nature of information storage and retrieval and identified technology as network storage. A critical piece of information or document in any organization is its records organization, and employees.

Table 3

Test of Significant Difference on the Responses According to Profile

Kruskall Wallis Test	Age	Gender	Program
Chi-square	1.176	3.893	1.962
df	3	3	3
Assym. Sig	0.759	0.273	0.58

On the significant difference of respondents’ perceptions with SRRMO services, table 3 presents the Kruskal Wallis test grouped according to the profile. It can be gleaned that asymptotic significance value (p-value) of age with 0.759, gender with 0.273, and program enrolled with 0.580, these p-values are greater than the 0.05 accepted margin of error of level of significance; therefore, the null hypothesis is accepted that there is no significant difference with the perceptions of the respondents as regards the implementation of the SRRMO services. This further means that regardless of the respondents' age, gender, and programs enrolled, they still perceive the same way as how SRRMO implements their services and in this case, implemented and even highly implemented.

Table 4*Problems Encountered by the Respondents on SRRMO services*

Problems Encountered	WM	Interpretation
1. The students lacks admission	3.01	Moderately felt
2. Wrong input of subjects/code units by students	2.79	Moderately felt
3. Subjects are not available or open for enrollment	2.87	Moderately felt
4. Some students do not observe the scheduled date of enrollment/late enrollees	3.08	Moderately felt
5. Some signatories are not around during enrolment.	2.78	Moderately felt
6. Some released TOR do not have soft-copy; re-encoding is needed	2.77	Moderately felt
7. Late application of SO due to lack of requirements of completion of grades.	2.74	Moderately felt
8. Retrieval of old documents	2.73	Moderately felt
9. Late compliance od incomplete grades	2.8	Moderately felt
10. Later submission of subject description for subject credited or lack of units credited subjects	2.81	Moderately felt
General Weighted Mean	2.84	Moderately felt

Legend: 4.21-5.00 (Highly felt-HF); 3.41-4.20 (Felt-F); 2.61-3.40 (Moderately Felt-MF); 1.81-2.60 (Slightly Felt-SF); 1.00-1.80 (Not Felt at all-NF)

On the problems encountered by the respondents, Table 4 presents the respondents' problems regarding the extent of implementation of SRRMO services. It can be noted that all the respondents uniformly perceived the same amount of 'Moderately Felt' problems they encountered with the SRRMO services. This means that students encounter several problems in the services rendered by the SRRMO, but these moderately affect them. These are largely the lack of admission requirements and non-observance of the schedule of enrolment. The influx of students during the enrollment process can also be a contributor to this finding.

Table 5*Test of Significant Difference on Problems Encountered with SRRMO Services according to Profile*

Kruskall Wallis Test	Age	Gender	Program
Chi-square	7.507	3.913	5.294
df	4	4	4
Assym. Sig	0.111	0.418	0.258

On the significant difference on the problems encountered by the respondents with SRRMO services, table 5 presents the Kruskal Wallis Test. Findings reveal that the asymptotic significance value (p-value) for age is 0.759, gender is 0.273, and program enrollment is 0.580; these p-values are greater than the 0.05 accepted margin error for the level of significance. Thus,

the null hypothesis is accepted that there is no significant difference in respondents' perceptions of the problems with the SRRMO services. This further means that regardless of the respondents' age, gender, and programs enrolled, they still have the same perception on the problems encountered with SRRMO services.

Table 6

Test of Significant Relationship on SRRMO Services according to Profile

Variables	Extent of Implementation	
	Fisher's Exact Test	2 sided Exact test
Age	30.657	.257
Gender	7.493	.394
Program	41.543	.006*

*Significant at $p\text{-value} < .05$

On the significant relationship between the respondents' perceptions with SRRMO services according to profile, table 6 presents the Fisher's Exact test. Findings reveal that the two-sided Exact Test significance value (p-value) for age is 0.257, which is greater than the 0.05 accepted margin of error, indicating that the null hypothesis is accepted that there is no significant relationship between respondents' perceptions of age. This also implies that age has no bearing on how respondents perceive the SRRMO's services.

In addition, it can be gleaned that with the 2-sided Exact Test significance value (p-value) of gender with 0.394, which is greater than the 0.05 accepted margin of error, the null hypothesis is accepted that there is no significant relationship with the perceptions of the respondents as regards gender. This further means that gender is not associated with how the SRRMO implements its services as perceived by the respondents.

Additionally, the 2-sided Exact Test significance value (p-value) of programs enrolled is 0.006, which is less than the 0.05 accepted margin of error, indicating that the null hypothesis is rejected and that there is a highly significant relationship between respondents' perceptions of programs enrolled. This means that programs enrolled by the respondents affect how the SRRMO implements its services. The implementation of the SRRMO services largely depends on the

programs offered. This can be attributed to the fact that every college/department has its separate unique process of enrolment other than the institutional enrolment scheme implemented in school.

Table 7

Significant Relationship between Respondents' Perception on SRRMO services and Problems Encountered

Variables	Extent of Implementation	
	Correlation Coefficient	Sig. (2-tailed)
Problems encountered	.003	.978

**Significant at p-value < .05*

Table 7 shows the significant relationship between the perceptions of the respondents with SRRMO service and their problems encountered. Using Kendall's tau-b test for significant relationships, it is possible to determine that the respondents' perceptions of the extent of implementation of SRRMO services in relation to the problems encountered (p-value, 0.978) is less than the 0.05 accepted margin of error. The null hypothesis is accepted, and there is no significant relationship with the respondents' perceptions of problems encountered. This means that the respondents' perceptions are not in any way affected by their problems encountered. This is because they perceived that the SRRMO services were implemented and only felt moderate problems regarding lack of admission requirements and non-observance of enrolment schedule.

5. Conclusion

This study determined the extent of implementation of Student Registration and Record Management at Dr. Carlos S. Lanting College for the S.Y. 2018-2019 utilizing descriptive-evaluative research design. It also identified the problems encountered by the clients on the services provided.

The results of the study showed that all the KRAs of the SRRMO services were perceived to be implemented. Regardless of the respondents' age, gender, and programs enrolled, they still perceive the same way as how SRRMO implements their services. Similarly, respondents uniformly perceived the same amount of 'Moderately Felt' problems they encountered with the SRRMO services. The results further showed that age and gender are not associated with how the SRRMO implements their services as perceived by the respondents. However, there is a highly significant relationship with the respondents' perceptions and the programs enrolled. The

implementation of the SRRMO services largely depends on the programs offered. This can be attributed to the fact that every college/department has its separate unique process of enrolment other than the institutional enrolment scheme implemented in school.

Since the majority of the respondents moderately felt the problems encountered with the SRRMO services, specifically on lack of admission requirements and non-observance of enrolment schedule, the study recommends a more accessible and convenient enrolment scheme be implemented in school. The digitization of students' registration and records would respond to this call. Institutionalization of the best practices of colleges/departments of the enrolment mechanism may be applied in school as enrolment scheme varies from college to college. Benchmarking is suggestively essential.

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Math Anxiety and Mathematical Representations of Grade 7 Students

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Abstract

Naturally, students are afraid to learn Mathematics that progresses as a fear of getting things wrong. This study utilizes the descriptive-correlational research design to test how the math anxiety and mathematics are connected to each other. Forty-two (42) Grade 7 students participated in the study during the school year 2020-2021. It used a researcher-made survey questionnaire on math anxiety and an examination on mathematical representations through modular learning. The math anxiety is indicated by mathematics test anxiety and numerical anxiety both with ten statements. Meanwhile, the examination was focused on the different components of mathematical representation such as pictures, manipulative models, written symbols, real-world situations and oral language. The result showed that students have high level of anxiety towards mathematics. Although students experience high level of test and numerical anxiety, their mathematical representations examination showed 'developing' level of performance. These two inverse results were supported by a no significant relationship between the math anxiety and students' performance in mathematics. Although the inverse relationship proved the effect of the anxiety on the test scores, the null hypothesis on the relationship of the variables was rejected. The study recommends further testing involving different modalities of learning such as online and hybrid.

Keywords: *Grade 7 Students, Math Anxiety, Mathematical Representations, Representations*

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1. Introduction

Mathematics can improve students' understanding through solving problems, logical reasoning and critical thinking skills. According to Sullivan (2013), mathematics formalizes some of the innate ideas about mathematical objects, develops the ability to make and write good proofs, improves problem-solving skills and aptitude to use mathematical knowledge and cultivates an appreciation for art and science of mathematics. While few enjoy the critical thinking in mathematics, majority fear the subject and its concept alone. The fear of mathematics is known as math anxiety. It affects many people in a passive behavior that can be distressing. As stated by Ziegler and Loos (2017), mathematics would not motivate students at school to do math, they cannot consider mathematics as a possible career choice. Furthermore, math anxiety may be a crucial factor which may determine the level of mathematics performance among high school students, to minimize the anxiety level and its attributes to commend their performance in mathematics (Jolejole-Caube et al., 2020).

That being said, math anxiety could affect students' working memory that might disrupt students such as their peers, struggles, and their study habits. Moreover, teachers who experience math anxiety has the tendency to transfer it to students (Ramirez et al., 2018). It causes negative behavior due to the fear being felt while working on numbers or solving word problems in the subject. Students could overcome the math anxiety if they could manage their stress and behavior by improving the basic mathematical skills that would help students to develop their performance in the class (Ruff & Boes, 2014).

According to Guita and Tan (2018), the learners who suffer from math anxiety may not be manifested in other disciplines. As a result, it is proven that students' anxiety is inversely linked to their mathematical success, because pupils who are fearful of circumstances, tension, and uneasiness associated with arithmetic may reflect anxiety in other disciplines. Given these premises, this study aims to evaluate the Grade 7 students' level of math anxiety and their performance in the mathematical representations. The mathematical anxiety is specifically focused on test anxiety and numerical anxiety while mathematical representations include pictures, manipulative models, written symbols, real-world situations and oral language. To refute previous studies linking students' anxiety to mathematical success, this study aims to prove the following hypothesis:

Ho1: There is no significant relationship between math anxiety and mathematical representations of Grade 7 students.

2. Literature Review

2.1. Math Anxiety

Laguen (2020), citing the results of the 2019 Trends in International Mathematics and Science Study, mentioned that Filipino Grade 4 students ranked bottom among 58 countries involved in the study, scoring 297 and 249 in Mathematics and Science, respectively. Filipinos ranking bottom is also true for the results in the Program for International Student Assessment (PISA) of the Organization for Economic Cooperation and Development (OECD). The poor performance in mathematics is normally linked to students' dislike of the subject (Khasawneh et al., 2021; Carey et al., 2016; Caviola et al., 2022; Essuman et al., 2021).

Math anxiety designates the deleterious actions of the students that assumes elicit tough reactions and the uneasiness of the attitude towards mathematics than the academic subjects (Downer et al., 2016). It reacts as the opposed mood that might affect the success and the future career of the students in the subject (Dagaylo-An & Tancinco, 2016). It states the feelings towards the subject that deals with the aspect of an individual. According to Seng (2015), the two categories of math anxiety include mathematics test anxiety and numerical anxiety. Test anxiety is described as 'I can't syndrome,' a feeling of uncertainty" (Gresham, 2007, p. 181) and internal pressure within students that they have not grasped the concept (Cavanagh, 2007). On the other hand, numerical anxiety occurs when undertaking math operations and manipulating numbers (Luttenberger et al., 2018; Kazelskis, 1998; Baloglu, 2007).

In the Philippines, math anxiety is normal to some students, but it could happen to every student at any age. Most of the students are afraid to learn math because of the following reasons: lack of motivation, failure in examinations, terror teachers, instant gratification, learned helplessness, the denigration of deep thought in the society and the neglectful of pressure-inducing parents (Lee-Chua, 2012). Futralan and Mamhot (2018) found that math anxiety of students increases from the lower grade levels to upper grade levels. Nevertheless, students with math anxiety still rise when students are confronted with subject matters that are innovative and come in loose. Students' increased anxiety when it comes to mathematics learning has been linked to an overburdened content of the curriculum and the additional courses or subjects that were not sufficiently framed in a pre-spiraled form.

According to Ramirez et al. (2018), there are ways to identify where math anxiety comes from. For instance, the student's reflection involves self-report questionnaires that would ask them to tell how they feel in the subject, the situations and the environment in the class. As Math Anxiety continues, things would not be cleared enough to improve their performance and it might affect student's big impact on them. It is mentioned that most people are vulnerable to the effects of math anxiety for the reason that the demographic factors still exist in the scale of the math anxiety and mathematical achievement.

2.2. Mathematical Representations

The basic manner in which students may comprehend concepts and problems in Mathematics is through proper mathematical representation. Since in most constructs, representation is provided by using a sign or a configuration of signs, elements through texts, or objects to symbolize, characterize, or depict something to properly represent, students use representations to support their comprehension by dealing with abstract ideas into specific ideas using logical thinking. Mathematical representations were efficiently used to clarify word problems and fractions, the use of visual representations and develop the conceptual understanding of the students (Widakdo, 2017).

Mathematical representations are one of the significant standards of learning to develop the students thinking and analyzing skills that processes the construction and abstraction of mathematical ideas of the students (Rahmawati et al., 2017). The purpose of mathematical representations is to get the idea of the student's capability of expressing mathematical concepts and apply the problems in real life (Siregar, 2019). The importance of mathematical representations is to grow the skill of students in conceptual understanding (Jitendra et al., 2016). Building connections between different representations is crucial to produce conceptual understanding. Due to the fact that students could struggle from presenting the tasks given, it might cause them to overthink about what students think about the task (Smith et al., 2018).

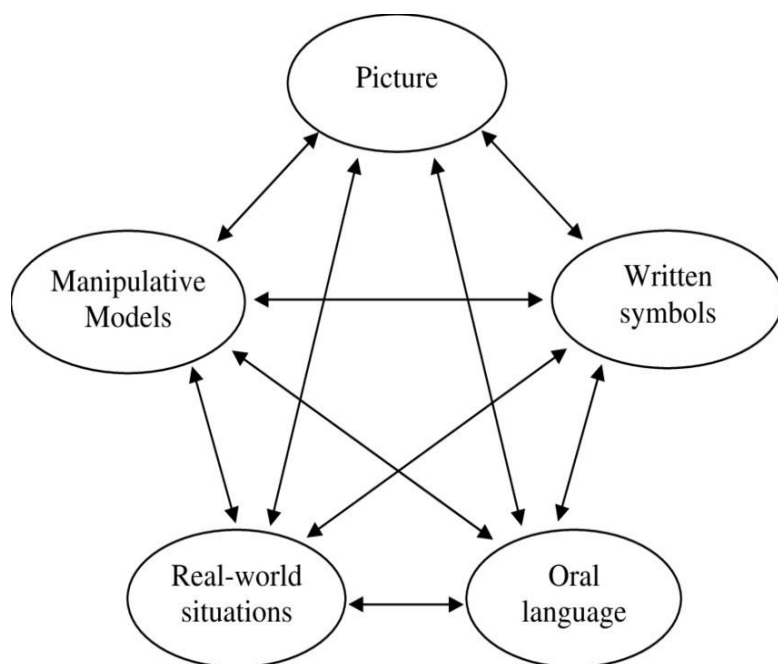
According to Widada et al. (2018), the augmentation of mathematical representations could implement the process of mathematical communication in oral and writing skills. Learning mathematics could be more memorable if the ability was taught in the meaningful manner. For instance, Trance et al. (2012) explored the visual representations of the students alongside mathematics to transform the educational curricula of learning from teacher-centered to learner-centered that utilizes the games and the learner's imagination to develop the student's interest within the traditional learning methods of mathematical representations. Similarly, Rahmawati et

al. (2017) used mathematical representation through images, tables, graphs, verbal representation, numerical and algebra. As such, it is important to translate mathematical representations for articulating mathematical concepts.

According to Van De Walle (2004) and Chen and Wu (2004), mathematical representation acts as the mathematical concept or relationship that forms into the ideas that are tangible. Students have the ability to create and represent their mathematical ideas to organize, record, select, apply and translate these mathematical representations to solve word problems. When students develop flexibility with a lot of diverse representations for mathematical ideas, it might obtain a skill to apply into new areas and add their own understanding to communicate ideas with other students.

Figure 1

The Modes of Mathematical Representations



Source: Van De Walle (2004)

Figure 1 shows the modes of mathematical representations. This shows the connection of the modes that produce the performance of each student. It also conceptualizes the manipulative models that involves mathematical concepts that could be more attractive, durable and simplistic. Pictures help students to engage their critical thinking and imagination. Written symbols utilize the value of using mathematical operations, Real-world situations applies the students' daily life basis and oral language that would help them to communicate mathematically.

3. Methodology

Descriptive-correlational research design was utilized in this study. As expounded by Baker (2017), in this design there are two variables which are tested for relationship. The participants of the study were 42 Grade 7 Students of an integrated high school in San Pablo, Laguna, Philippines. These students are in one group duly enrolled during the school year 2020 – 2021 consisting of 18 males and 24 females. All the students in the class were included as study participants.

There are two data gathering instruments used in the study: survey questionnaire and test. The researcher-made survey consists of two sections that assessed the test anxiety and numerical anxiety of the participants. There were ten (10) questions for each section. On the other hand, the examination tested the students' knowledge on mathematical concepts. It is focused on picture, written symbols, oral language, real-world situations and manipulative models. The survey questionnaire was tested for internal consistency using Cronbach Alpha as shown in table 1.

Table 1

Cronbach's Alpha Result

Subscale	No. of Items	Cronbach's Alpha	Internal Consistency
Math Anxiety			
Mathematics Test Anxiety	10	.939	Excellent
Numerical Anxiety	10	.943	Excellent

During the first week of the class, the module on modes of mathematical representation was given to the students as their preparation guide for the assessment. After two (2) weeks, a printed copy of the questionnaire and examination were given to each student. After another two (2) weeks, the answered survey questionnaire and examination were retrieved and tabulated.

To ascertain the math anxiety of the respondents based on the variables and descriptors in the study, mean and standard deviation were determined. In evaluating the result of students' examination in mathematical representations, frequency distribution was used. Lastly, to test whether there is significant relationship between math anxiety and mathematical representations, Pearson product-moment correlation was used.

4. Findings and Discussion

Table 2

The Students' Manifestation of Mathematics Test Anxiety

Statements	Mean	SD	Verbal Interpretation
Whenever I take Examinations in Mathematics...			
1. I feel nervous if the teacher gives feedback to my output, then I can no longer answer the questions in the next activity.	2.64	0.73	Agree
2. If I open module to review concepts, it felt like I'm finding it difficult to understand due to heavy concepts presented.	2.98	0.64	Agree
3. While I'm answering a test, I think about how badly I'm doing.	2.45	0.83	Disagree
4. Time affects my performance whenever I'm taking a test.	2.83	0.76	Agree
5. My feeling as I accomplish the test is that I have done badly.	2.60	0.70	Agree
6. I am afraid that I can't catch up with the rest of the class.	2.62	0.76	Agree
7. I have a feeling that we will have to take a Math Test in advance without any announcement.	2.74	0.77	Agree
8. I become tensed while preparing myself for a Math Test.	3.02	0.64	Agree
9. I may not do well in Math Tests.	2.74	0.89	Agree
10. My heart is beating fast during examinations.	2.90	0.79	Agree
Overall	2.75	0.41	Agree

Legend: 3.50 – 4.00 (Strongly Agree/Very High Level of Anxiety), 2.50 – 3.49 (Agree/High Level of Anxiety), 1.50 – 2.49 (Disagree/Low Level of Anxiety), 1.00 – 1.49 (Strongly Disagree/Controlled Level of Anxiety)

Table 2 shows the manifestation of the student-respondents towards mathematics test anxiety. It is stated that student-respondents agreed to all the indicators with the overall mean of 2.75, and standard deviation of 0.41. It signifies that most of the students have high level of math anxiety while anticipating a mathematics test in a modular setting. According to Oxford Learning (2017), students become worried as a result of the deadlines imposed by timed tests. As a result, people forget concepts that they don't have trouble recalling at home. The student's dread of failing is validated because these assessments can have a detrimental influence on marks. This can lead to a difficult-to-break vicious cycle. The results are same as the findings from Reyes and Castillo (2015) that mathematics test anxiety is a physiological condition which involves pressure and discomfort before, during and after taking the test. It connotes that student find it difficult to pass the Mathematics Test.

Table 3*The Perception of the Student-Respondents towards Numerical Anxiety*

Statements	Mean	SD	Verbal Interpretation
Whenever I face Numerical Figures and Concepts...			
1. I feel frustrated to do mental arithmetic during class.	2.71	0.74	Agree
2. I'm hesitant to show my calculations for the solutions of the problem.	2.88	0.63	Agree
3. I was nervous given a set of numerical problems involving operations.	2.71	0.83	Disagree
4. I felt uneasy when I try my best to solve mathematical problems.	2.93	0.78	Agree
5. I discern myself that Mathematics seem like hard for me.	2.90	0.69	Agree
6. I just "freeze up" when I saw a math problem.	2.52	0.92	Agree
7. I was given a Math assignment with lots of numerical problems to answer.	2.60	0.70	Agree
8. I felt anxious when I think about numbers.	2.64	0.76	Agree
9. I'm concerned about my skills to solve mathematical problems.	2.98	0.72	Agree
10. I'm worried that I can't express my solutions and calculations in front of the class.	2.86	0.78	Agree
Overall	2.77	0.43	Agree

Legend: 3.50 – 4.00 (Strongly Agree/Very High Level of Anxiety), 2.50 – 3.49 (Agree/High Level of Anxiety), 1.50 – 2.49 (Disagree/Low Level of Anxiety), 1.00 – 1.49 (Strongly Disagree/Controlled Level of Anxiety)

It can be gleaned from table 3 that students agreed from the indicators provided with the overall mean of 2.77, and the standard deviation of 0.43. From the result it can be seen that students are frightened to perform calculations and solutions manifesting numerical anxiety in daily life situations and disrupts the performance of the individual.

Numerical anxiety are omnipresent from the perspective of a single individual of the student and the civilization as a whole. It also involves the mathematics in the real world and academic situations (Mitchell, 2018; Skagerlund et al., 2019). In the study of Dowker et al. (2016), numerical anxiety was given solution in the past years by enhancing students to focus on the mathematical performance to lessen the anxiety. Santos et al. (2015) recommended to utilize mathematical modeling that could have impact towards numerical anxiety.

Table 4*The Students' Performance in Mathematical Representations*

Scores	F	%	Interpretation
Pictures			
4	--	--	Excellent
3	6	14.30	Proficient
2	10	23.80	Developing
0-1	26	61.90	Beginner
Manipulative Models			
7-8	4	9.50	Excellent
5-6	9	21.40	Proficient
3-4	6	14.30	Developing
0-2	23	54.80	Beginner
Written Symbols			
2	17	40.50	Excellent
1	20	47.60	Proficient
0	5	11.90	Beginner
Real-World Situations			
15-18	6	14.30	Excellent
10-14	27	64.30	Proficient
5-9	5	11.90	Developing
0-4	4	9.50	Beginner
Oral Language			
7-8	4	9.50	Excellent
5-6	4	9.50	Proficient
3-4	13	31.00	Developing
0-2	21	50.00	Beginner

Table 4 shows the test performance of the students in mathematical representation.

In terms of pictures, most of the student-respondents are in the beginning level (61.9 percent). Essentially, it was observed that student-respondents have poor understanding of the concepts found in the examination. Meanwhile, some student-respondents (14.3 percent) are Proficient in analyzing pictures. Azizaa (2017) argued that pictures are fundamental in forming the thoughts of students with the use of their own imagination that grows the student's creativity and understanding via learning Mathematics in the Classroom.

In terms of manipulative models, students (54.8 percent) are also in the beginning level. Majority of the student-respondents failed to apply the manipulatives given in the examination. It is mediocre that student-respondents did not attempt to answer it or use the manipulatives appropriately, and refused to answer the questions. Although 9.5 percent of the student-

respondents received “Excellent” in their total score, fewer student-respondents clearly used the manipulatives prior to the given. Moreover, these students are those identified as students who excel in class. Meke et al. (2019) contended that manipulatives in mathematics intend to aid students to solve mathematical problems, utilize the tool, concrete abstract ideas and make the subject more interactive and fun that increases student’s learning interest in the learning process to understand the concept in the given problem.

In terms of written symbols, students are predominantly (47.6 percent) proficient. This result can be interpreted that students merely understand the essence of solving equations and representing written symbols mathematically. On the other hand, few of the student-respondents (11.9 percent) were “beginners”. Fundamentally, fewer student-respondents did not operate the values of performing mathematical operations that refers to the mathematical quantities given. Based on the study of Selvianiresa and Jupri (2017), the aptitude to attain the mathematical symbols was to develop the numeracy skills early to answer the symbols and equations easily. Also, teachers have to deliver the topic as well as students to understand the core of Roman Numerals in the daily life, as long as you could saw in the clock, books or novels, and the Bible. In relation to this, mathematical symbols could envisage the number sense that leads to strong efficient and perceive the student’s performance. But it was not enough to reach the mathematical ability, it requires experience to develop the purpose of mathematical symbols in using number operations and equations (Hua et al., 2019).

In terms of real-world situations, students (64.3 percent) were also in the proficient level. It shows that, most likely, students can apply mathematical concepts to real-world situations. However, some student-respondents (9.5 percent) were in the “Beginning” level in Real-World Situations. Ojose (2011) mentioned that students shall apply real-world situations that is pertinent to their interest, either educational or professional.

Majority of the students (50 percent) were in the beginning level in oral language. It further denotes that student-respondents fail to develop mathematical thinking skills that could affect the way students communicate and explain their solutions to mathematical problems. In contrast, a few student-respondents (9.5 percent) were “proficient” and “excellent”. These students are capable to answer the word problems given in the oral languages and accurately communicates solutions to the problems and the concepts given. As determined by Fuchs et al. (2018), oral language is one of the predictors that plays a role in solving word problems. Moreover, students

are enabled to use the representation to interpret the physical, social and mathematical phenomena (Minarni et al., 2016).

Table 5

Relationship Between Math Anxiety and Mathematical Representations

Variables	Pictures	Manipulative Models	Written Symbols	Real- World Situations	Oral Language
Mathematics Test Anxiety	.024	.051	.129	-.023	.072
Numerical Anxiety	-.095	.149	.044	-.144	-.076

*Legend: **. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

Based on table 5, math anxiety does not significantly relate to mathematical representations of students by taking a math test and solving numerical concepts. Even though majority of the students have higher level of anxiety in mathematics, their performance in mathematical representations is in the developing level. The results further show negative or inverse relations for most of the variables. The result is congruent to the study of Sokolowski and Ansari (2017) that there is no proof that math anxiety of the students would affect their mathematical ability, Puteh and Khalin (2016) that no significant relationship between the level of math anxiety of the female and male students and Susilawati (2020) that there is no significant relationship between mathematical representations.

5. Conclusion

This study tested the relationship between the level of math anxiety and performance of the students in mathematical representations using descriptive-correlational design. The evaluation of the 42 Grade 7 students no significant relationship between the math anxiety and performance in mathematical representations. It signifies that most of the students are still aware of their own mathematics anxiety and fear of answering problems in mathematics but these do not greatly affect their abilities to answer the questions. Although the students' math anxiety level is relatively high, the test results showed developing performance in mathematical representations.

Due to the COVID-19 restrictions, individual mathematical skills of the students were not actually monitored in the modular distance learning modality. As such, it is recommended that further studies be conducted with other sets of students to verify the results. The study can also be

replicated in different learning modalities such as online or hybrid to validate the outcomes of the current study.

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