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Research Article

Readiness in Adopting a Blended Learning Approach in Science: Challenges Encountered and Breakthroughs

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Abstract

The aim of this research was to determine the teachers' and students' readiness on blended learning. Also, the struggles encountered by the teachers as well their best practices in the blended learning modalities were identified. To attain the level of readiness of the students and teachers to the new normal educational learning methods, an adopted but modified survey instrument was used. To determine the personal experiential accounts on the challenges and difficulties encountered under the new normal educational learning modalities and their breakthroughs or good practices in providing solutions, open-ended questionnaire was employed. Data revealed that the most available gadget of the respondents was mobile phone while the least was desktop computer. The level of readiness of the teachers and students in blended learning modalities was generally high. Among the six dimension of readiness, only online learning scored low for both teachers and students. Teachers most common difficulties encountered in blended learning were unstable internet connectivity, insufficient time to prepare learning materials, captivating students' focus in learning, and difficulty in addressing individual needs of their learners. The most common worst experiences they had were the following: online engagement thru chats, teaching problem- solving skills online, unavailability of materials for the experiment, and the academic dishonesty of the students. From the difficulties that the teachers have encountered, all of them looked for better internet service provider, trained themselves how to do the recording for the video lessons using online resources or through departmental tutorials, used alternative household materials for the experiment, and consistent online interaction to the learners thru personal chats via messenger and text as well as sent emails. For them, the best practices that are worth sustaining are preparation of pre-recorded video lessons and the extensive use of the features of the SMU LMS. As an output of this study, recommendations towards an enhanced blended learning thru the SMLP features in teaching and learning science were provided.

Keywords: Blended Learning, Readiness, Science, Challenges Encountered, Breakthroughs

Introduction

Today's emerging situations has led schools to move from traditional face-to-face classrooms to the new online classrooms. The transition to online teaching and learning challenges the expectations and roles of both teachers and learners. According to Redman (2011), this shift in education offers new opportunities but also new challenges to all the members of the teaching and learning process.

The Philippines' educational system has already been experiencing various challenges in the past 8 years since its sudden shift from the Basic Curriculum Education to the K-12 Curriculum when it is put into another level and dimension of a more challenging technology-based teaching and learning process brought forth by the Covid-19 pandemic.

This forced schools to shift their courses to online learning and that has been very challenging. With this new reality, educators all over the world have an opportunity to re-think about how education is to be delivered to succeed. Despite the technological advancements, educators still largely favour the traditional face-to-face approach. As technology becomes an integral part of our daily lives, it is hard to imagine that it will not have a dominant role in our education system. In emergent situations like the Covid-19 pandemic, educators must totally embrace educational technology and online learning (Obańa, 2020).

Secretary Leonor Briones of the Department of Education (DepEd) emphasized that the Philippines has been using online instruction for decades already, citing the University of the Philippines as one of the schools which specializes in distance education for the longest time and those who take up education and study education are already exposed to this distance and blended learning (Custodio, 2020). Thus, it is clearly pointed out that education must be delivered and sustained in any circumstances we are facing and in every possible way with respect to the learners' needs and conditions.

Although this inevitable phenomenon has shaken schools unprepared for the unforeseen change, it promoted ingenious ideas of how educators must continue and sustain the teaching and learning process for all students who in fact have different learning

abilities, styles, resources, and filial support. On top of that, some students need to do the remote learning in an almost impossible way due to the lack of facilities and slow internet connection that fuel the success of implementing various blended learning modalities.

Apparently, the availability of web-based resources and high-speed internet infrastructure has extended the opportunities to conduct blended learning and new ways of distance learning beyond virtual classroom webinars (Connie, 2015). Schools all around the world are increasingly using blended approaches that combine online and face-to-face teaching and learning. Given that there is the abrupt and devastating entry of the corona virus disease-2019 (COVID-19) into the educational system picture, the pressing question for educators now is this: How will the education system survive?

In a logical sense, teachers' knowledge and readiness in implementing the different blended learning modalities must be on par with their digital skills to efficaciously meet the expectations of their learners in experiencing a fruitful teaching and learning process using blended learning.

The integration of digital technology into teaching, learning and assessment is a complex and challenging process that goes well beyond introducing digital technology in schools. Integration requires carefully considering within the broader context of schoolwide improvement issues such as change management, educational leadership, teacher professional development, evaluation systems and sharing best practices. First, schools face external issues surrounding insufficient equipment or connectivity and inadequate technology training. If teachers and students do not own an adequate computer and a fast internet connection, implementing online or virtual learning is unfeasible. Furthermore, if teachers are not provided practical training on new technologies, they will not be capable of using them to their full potential (Obana, 2020).

More than the students, teachers are feeling the pressure of implementing the blended learning modalities most especially the online distance learning. The inevitable digital skills that that come along with it demands new knowledge and training for teachers to successfully utilize technology-based media.

Research Questions

This study aimed to determine the teachers' and students' readiness on blended learning. Also, the struggles encountered by the teachers as well their best practices in the blended learning modalities were identified. Specifically, it sought to answer the following questions:

1. What is the level of the teachers' readiness in the blended learning modalities?
2. What is the level of the students' readiness in the blended learning modalities?
3. What are the teachers' struggles in teaching science using the blended learning modalities?
4. What are the best practices done by the teachers in implementing the blended learning modalities in teaching science?
5. What recommendations can be provided to enhance the SMU Multi-Modality Program of the school?

Literature Review

Blended Learning

The history of blended learning vividly tells us that it neither emerged from the onset of the digital age nor the Covid-19 pandemic but during the times when postal services were used to send and receive lessons and feedback (Pappas, 2015). Undeniably, blended learning has become an integral part of educators' desire to fulfil their noble duties and to sustain these responsibilities in diverse ways and means utilizing various resources available.

Education is not just about academics but also learning time management, discipline, and blending learning helps both students and teachers to learn according to their own pace and schedule. Blended learning consolidates the best of both traditional and digital methods of education while classroom learning is important to incorporate overall discipline. Hence, online learning helps students to customize their education. Blended learning methods enable students to explore information or guidance online, which can be accessed any time they need and classroom learning helps to build better relations between the learner and the teacher. Extra-curricular and various other hands-on activities help students to build their socio-personal effectively and online learning offers a wider selection of content and information they need for the overall physical and psychological development of their personality. Blended learning makes it easy for learners to communicate about their assignments, announcements, test results or anything else they might need to know from their teachers and makes assessment and evaluation more personalized and

effective. Education becomes less expensive and more accessible to a wide range of learners. Blending learning helps students to explore technology and use different tools or techniques for learning, for example, PowerPoint, Virtual classrooms, Video lectures, etc. Blended learning improves the quality of education and information assimilation while making teaching more efficient and productive (Das, 2021).

However, the effective implementation of blended approaches is a complex process, especially when aiming for educational change rather than supplementing traditional practices (Davis, 2008). Research indicated that some of the main challenges that emerge are linked to students and their readiness to learn in a blended environment teachers and their commitment and capability to effectively teach through blended approaches (Parkes et al., 2011), and school leaders and their provision of adequate support to teachers and students (Stevens, 2011).

In a research conducted regarding the teachers' intrinsic and extrinsic readiness for blended learning in Malaysia, the findings showed that the individual innovation level was high but the specific information technology level was moderate. This indicated that the teachers were not prepared to know how to implement teaching and learning using blended learning and were unprepared to implement it. From this we can ascertain that the teachers who were very opentowards a new innovation in their lives might also be so open towards accepting more specific innovation such as the usage of blended learning in their teaching. While this study found that 78.8% of teachers had Internet access at home and 90.8% had personal computers, these aspects did not guarantee that the they would be excited to learn new technology and pedagogy towards creating a 21st century teaching environment which includes blended learning and its usage. This could be due to the teachers' lack of new knowledge about the variety of teaching methods from time to time and this caused them to be less innovative. As such, teachers' knowledge about blended learning is important to prepare them to utilize the approach effectively in their teaching and learning (Noraini Mohamed Noh et al., 2019).

Laal and Ghodsi (2012) mentioned that the transition in classroom practices ultimately rely on teachers. It requires them to learn new strategies to cater the demands of online learning. And although the trend of education has changed, the primary concern of every educator should always be to maximize student learning (Laal, 2013). As compared to face-to-face education, the demands and challenges of online learning is greater (Finch & Jacobds, 2012). In fact, Amro, Mundy and Kupczynski (2015) pointed out that educators in various levels face challenges in meeting the needs of online learning while maintaining students' learning.

Research indicates that blended approaches involve a range of advantages for students including, flexibility (Pratt & Trewern, 2011), student engagement and motivation, development of independent learning (Parkes et al., 2011) and new ICT skills. Most importantly, e-learning, including blended approaches, is regarded as a means for educational reform, modernization of schools, and increased access to a world-class education (Powell & Barbour, 2011).

In a study conducted by Ventayen et al. (2020), they concluded that the majority of respondents were ready for Open and Distance Education regardless of their statuses. The study showed that the teachers were ready when it comes to technology facets and that teachers were equipped with a computer whenever they are at home or at the office. Hence, this analysis reflected that teacher can travel with computers and there will be no hindrance in conducting an online lesson. Besides, respondents have access to their internet more often and can search for anything on the internet for their needs. It also revealed that the respondents were competent in using E- mail and in the word processing software, capable of downloading files and attaching it to an email, knowledgeable on using presentation software such as PowerPoint, familiar in creating lesson through blogs other websites and were comfortable in using Social Networking Technologies such as Facebook and Twitter. These findings reflected a great realization that in a digital era like this, it does not take so much things to learn and understand in order to be ready to take the exigent steps to adapt with the fast-paced world challenged by an inescapable circumstance such as this pandemic. It is the teachers' ingenious initiatives to explore and enhance what became a part of them in their daily work as educators that will drive them to acclimatize to the continuous struggles and challenges, they will continue to face in the implementation of blended learning.

Indeed, schools especially educators' ingenuity has led to an extensive effort in extracting resources relevant to the effectiveness of implementing the blended learning modalities. This is reflected in the many efforts of Philippine schools to positively undertake extra miles in support of this educational innovation.

A new era of teaching and learning has redefined the

delivery of instruction at Lyceum of the Philippines University-Laguna. Teachers and students have harnessed the power of digital technology by using Blackboard Open LMS, an online learning management system platform of the school. With more than half of the teacher population using Blackboard to deliver content and perform assessments, blended learning has now become the new norm. Blended learning is an approach to education that combines face-to-face and online learning. Recent studies prove that blended learning is more superior to traditional methods in delivering specific course outcomes. This is why LPU-Laguna has fully embraced digital education by educating, simplifying and monitoring the use of LMS not to replace, but to enhance the current status of classroom instruction (Catapang, 2018).

Similar optimism was written in an article published by The University of the Philippines (UP) stating that the COVID-19 pandemic that shut down the world merely catalysed this overdue transformation of higher education in general and UP education in particular. The work during this unprecedented time is challenging but exciting, too, as opportunities open up for higher education institutions, including UP, to experiment with new and creative ways of delivering programs and courses, and to institutionalize innovations that enhance learning. Indeed, the "new reality" has revealed possibilities that were perhaps not as obvious before. Physical infrastructure is required to support remote learning. UP is currently undertaking several initiatives to prepare its infrastructure, including: maintaining its institutional subscription to Zoom for faculty meetings, webinars, workshops, synchronous classes, student group work and interactions; discussing with telecommunication companies the procurement of gadgets, Internet connectivity, support for educational data packs, computer loans and subsidies for financially challenged students and faculty; launching fundraising and resource generation campaigns among UP alumni and private sector donors for computers and laptops for students; and, exploring the use of TV and radio as an alternative to the Internet for areas with poor signals or Internet connectivity (Llaneta, 2020).

The use of blended learning technology in classroom teaching and learning process is an innovative method. It combines the quality of both online learning and classroom method. It does not only create interest in learning through audio-visual aid but also develops better understanding and group feeling among student. There is no doubt that the new technology used in teaching and learning process enhances the performance of students. It increases the collaboration among participants. More information can be gathered by using technology and sharing of information can be done not only within the campus but across the world. The flexibility and accessibility of the method make it more interesting and challenging. It provokes students to complete their task in given time. Current generation of students are digital natives, they are born with the Internet network, and now they are experiencing the transition from the old to the new web-based technology, which is more participatory, more collaborative. The development of blended learning in the school system is still at its initial stage. In the era of ICT, the use of technology will not only create a better learning but also connects students with outside world. Now there is a high time for countries to use technology in the field of education and let the students discover the knowledge of their choice (Singh, 2015).

BE-LCP in the Philippines in the time of COVID-19 Pandemic

In the Philippines, DepEd operationalizes the Basic Education Learning Continuity Plan in the time of COVID-19 (BE-LCP) that requires the complementary and broader roles of parents, guardians and other household partners, and members of the community to support the learning process of the students at home (DepEd Order No. 012 s. 2020). The Learning Continuity Plan (BE-LCP) is the Department of Education's major response and commitment in protecting the health, safety, and well-being of learners, teachers, and personnel (Montemayor, 2020). And with the belief that learning must not stop on account of the pandemic, the Philippine educational sector is keen on exploring the viability of blended learning approach. Though not entirely new, the features of blended learning are seen as a possible remedy for the shift from traditional face-to- face instruction to combination of modular and e-learning system of education. However, many are still doubtful as to its feasibility as it seems very unlikely that it will on average replace the learning lost from school. Given the growth of blended teaching and learning in Philippines and internationally and the complexity of educational change as a result of Information and Communication Technologies (ICT), it is apparent that there is a need for further research on the use of blended approaches in schools and the implications for key stakeholders to inform professional and organizational development. How students and teachers are ready in this approach of teaching and learning must be explored. Furthermore, it is important to determine their struggles and how do they overcome

these struggles in order to facilitate continuous learning and teaching.

As a further response to the challenges posed by Covid-19 in the lives of learners and educators in the Philippines, DepEd Secretary Briones has introduced the Basic Education Learning Continuity Plan (BE-LCP) to uphold quality education fitted to whatever circumstances they are experiencing at the moment.

The BE-LCP covers the essential requirements of education in the time of COVID-19, such as the most essential learning competencies (MELCS), multiple learning delivery modalities for teachers, school leaders and learners, required health standards in schools and workplaces, and special activities like Brigada Eskwela, Oplan Balik Eskwela, and community partnerships.

Despite best efforts to address the challenges faced by the Philippines' educational system, such development seems to be more complicated in the field where teachers and students experience the reality than in journals and books that offer guidelines in implementing the different learning modalities in this pandemic situation. The DepEd's Information and Communications Technology Service (ICTS) has summarized some of the critical challenges that we face, as well as the updates on ongoing initiatives, in relation to distance learning technologies:

- *Access to the internet is a major limiting factor to online learning. This can be mitigated by loading digital materials into the devices of learners.*
- *Teachers would have to be trained in the use of technology for learning delivery. DepEd has already conducted two online training programs this year with 17,000 Participants each on the use of technology in teaching. This will be expanded, but there are teachers with limited knowledge in ICT, as well as with no internet access.*
- *Early grade levels need to be closely supervised by parents in the use of technology. Orienting the parents will be a major challenge, and there are questions as to whether parents are ready to take on this role.*
- *Senior high school vocational tracks have classes that require hands-on sessions in laboratories that may not be applicable in home-based approaches even with technology.*
- *DepEd has migrated its systems into Cloud Servers that can be scaled up to meet the increasing demand for technology-based education.*

Despite the drawbacks of blended learning, DepEd Secretary Leonor Briones asserted that the Basic Education-Learning Continuity Plan (BE-LCP) initiative will make it possible for schools all over the country to continue the 2020-2021 academic year and that this technique of distance learning will be implemented in three ways—through online classes, modular learning through printed or digital materials, and through broadcasting classes via TV and radio. She explained that schools may choose from any of these methods to conduct classes to the students.

Enrolment in the current school year started last June 1 by text messaging or online means. As of September 2021, the DepEd said enrolment in public and private schools had reached 23,987,944 students nationwide. At least 22,019,105 had enrolled in public schools while 1,923,179 in private schools. The DepEd also reported that over 1 million devices and gadgets, tools for blended learning, had been received by 93 percent of teachers and students nationwide. But a survey by the department showed that majority of 700,000 teachers still lacked gadget and internet access, which are necessary for blended learning. The Philippine Center for Investigative Journalism (PCIJ) cited the survey in a report, saying 13% of respondents did not have laptops or computers. Out of the 87 percent who had gadgets, only 41 percent had internet connections. The survey also found that 49 percent had mobile phone signals but no internet connections in their households. At least 10 percent didn't have both. The difficulties of access to information communication technology (ICT) are felt most by students. Children from impoverished areas were likely to be at a disadvantage at the start of classes. Aside from difficulty in access to internet services with enough speed for blended learning, increasing internet subscription costs also hound learners and instructors. Hardware and software, must haves in blended learning, could be costly to everyone—educators, students and parents (Baclig, 2020).

Despite the reports on the challenges faced by those parties affected, the optimism of Briones gained support from the Palace spokesman Harry Roque Jr. in a statement released in an article of The Manila Times (2020), *'Challenges' await blended learning'* where he said, *"The system may not be perfect and there may be issues as we shift to flexible learning, which includes modular learning and supplemented by broadcast and online classes; but we are confident that DepEd would address these challenges."*

Access however, as they are all aware, is another issue of utmost concern and they have devised various modalities to ensure that online learning is only one of the options among all others in this new learning

environment. Their field units will determine the most appropriate combinations or strategies for every locality as the look into addressing equity concerns of our constituents in this new arrangement (DepEd, 2020). Hence, this study was very timely to contribute to data that will strengthen the determination of the most appropriate alternative learning strategies in this time of pandemic.

Flexible Learning Modalities

E-learning

E-Learning is "the use of internet and digital technologies to create experiences that educates fellow human beings" (Horton, 2001 as cited by Bose, 2003). E-Learning was born during the dot-com frenzy, and the term "e-Learning" was not well known until a few years ago. But now the term is common, especially in the University community. In 1999, more than 50% of US college students were planning to have Internet access from their dormitory rooms, and virtually all were planning to have access from campus locations. Today, more than 90% of students have accessed Internet, with 50 percent accessing Web daily, and nearly 40% of all college courses using Internet resources (OECD, 2001 as cited by Bose, 2003).

As a network technology, the Internet creates, fosters, delivers, and facilitates learning, anytime and anywhere. In distant modes of education, it provides connections to outside computers (Wheeler, 2003). Network technologies also make possible delivery of individualized, comprehensive, dynamic learning content in real time, aiding in the development of knowledge communities. By making them accountable and accessible, it links learners and practitioners with experts and enables people and organizations to keep pace with the rapid changes that define the Internet world. It is a force that gives people and organizations the competitive edge, permitting them to participate in the rapidly changing global economy. Clearly, the penetration of Internet in the post-secondary sector is significant.

In response to the current situation where COVID-19 pandemic exists, educators have been instrumental in finding new ways to ensure learning continues for children by developing online and offline learning materials; learning about the working of video conferencing tools to be able to meet students regularly and conducting mental & social well-being sessions during the start of the school day and at closure. Virtual school is not just about taking a lesson through a video conferencing tool; it involves more than that. It involves a paradigm shift in pedagogy through an understanding of the blended learning model by teachers, parents and students. The balance of online and offline tasks is a critical aspect to consider while designing the timetable and lesson plan. This model helps learning to continue beyond the four walls of the classroom, allows students' choice and flexibility to learn at their pace, creates more opportunities for collaborative tasks along with providing opportunities to rethink the mode of assessments & feedback. Virtual education has opened up possibilities of rethinking the way we are doing teaching & learning. The use of educational technology tools can begin to transform the classroom, and most of it depends on the creative agency of the teacher (Karthik, 2020).

In the Philippines, the term "e-learning" is used synonymously with online learning and concerns the online delivery of instructional content as well as associated support services to students. This article is primarily based on experiences at the University of the Philippines Open University (UPOU). It showcases the development of e-learning in the country from just a supplement within once-a-month face-to-face (FTF) sessions in a university learning center to more extensive use of a learning management system (LMS) as a venue for academic discussions as well as learning assessments, sharing learning resources and content, and students submissions of course requirements. Also discussed is how the mobile phone is being used to bridge the digital divide and make the digitally excluded sectors of the Filipino society become part of the online learning program of the university. The mechanisms being used to ensure quality education in e- learning as well as the challenges faced by e-learning institutions is extensively detailed (Dela Pena, 2009).

Blended Learning (BL)

One of the most fundamental distinctions among different online learning activities is whether they are offline, blended or conducted purely online - online instruction serves as a replacement for face-to-face instruction (e.g., a virtual course), with attendant implications for school staffing and cost savings (Bakia, Shear, Toyoma, & Lasseter, 2012). Purely online instruction may be an attractive alternative for cost reasons if it is equivalent to traditional face-to-face instruction in terms of student outcomes. Blended learning, on the other hand, is expected to be an enhancement of face-to-face instruction. Many would consider blended learning applications that produce learning outcomes that are merely equivalent to (not

better than) those resulting from face-to-face instruction without the enhancement a waste of time and money because the addition does not improve student outcomes. Different online and offline pedagogical approaches will promote different learning experiences by varying the source of the learning content and the nature of the learner's activity (Nguyen, 2017).

Blended Learning is a modern educational strategy that has replaced e-learning gradually in most educational institutions. According to Salama (2005), BL is a logical and scientifically acceptable alternative to e-learning, has higher yields, is less expensive, and incorporates more sophisticated types of learning. BL is a term that explains the various attempts made by teachers to incorporate the element of technology into the traditional classroom setting, because of the efficiency this arrangement brings. BL aims at interactive learning, resulting in the blending or mixing of a teacher's role in a traditional classroom with that in the virtual one. The technology applied in BL is often intended to generate optimal performances by students. The systems are intended to promote learning by facilitating the integration of visual cues and educational concepts.

The use of virtual environments acts to capture the attention of the audience involved while augmenting interactions between subject parties (Graham, 2013). BL combines forms of direct and indirect online learning and usually involves the internet and intranet, while indirect learning occurs simultaneously within traditional classes. Blended learning is defined as learning using different means connected together to teach a particular substance. These methods may include a combination of direct lecturing in the auditorium, online communication, and self-learning. Julie believes that blended learning is a newly used term, but it was prevalent before; it blends various educational patterns of computer and adds e-learning through the internet; it includes e-mail service, in addition to traditional education where the teacher has the biggest role (Hashimi and Azzawi, 2007).

Modular Learning

Online learning is not the only type of distance learning. While the COVID-19 pandemic sent educational institutions scrambling to move classes online, many forget that there are other modes for distance learning. For instance, the Department of Education (DepEd) developed TV/radio-based instruction methods to utilize existing technologies that reach rural areas. However, the most popular mode of distance learning under consideration is modular learning. In this time of COVID-19 pandemic, Filipino students prefer modular learning. Modular learning is a form of distance learning that uses Self-Learning Modules (SLM) based on the most essential learning competencies (MELCS) provided by DepEd. The modules include sections on motivation and assessment that serve as a complete guide of both teachers' and students' desired competencies. Teachers will monitor the learners' progress through home visits (following social distancing protocols) and feedback mechanisms, and guide those who need special attention.

Based on data gathered via DepEd's National Learner Enrolment and Survey Forms (LESFs), 8.8 million out of the 22.2 million enrollees (39.6% of total respondents) preferred modular distance learning for the upcoming school year. Meanwhile, 3.9 million enrollees (17.6%) were partial to blended learning (which uses a combination of different modalities), 3.8 million (17.1%) preferred online learning, and 1.4 million and 900,000 enrollees preferred TV-based and radio-based learning, respectively. In a public secondary school in San Carlos City, Pangasinan, modular learning also emerged as the most preferred learning mode. According to their local LESFs, learners cited the lack of available gadgets and internet connection as the main reasons why they preferred modular learning over online learning (Manlangit, Paglumotan, & Sapera, 2020).

Asynchronous Learning

Asynchronous learning is characterized by different discourse features and may be used for different pedagogical purposes (Romiszowski & Mason, 2004). It has been argued that asynchronous communication may provide more student control and flexibility (Kearsley, 1995). It is the most common type of communication in distance and online education (e.g., e-mail, discussion board) ever since the days of correspondence studies (e.g., letters). Asynchronous communication allows online students to log on to the class at any time, think about what has been written and formulate considered replies when they wish (Palloff & Pratt, 1999). Thus, students have more time for reflection (Hansen et al., 1999) since discussions usually are scheduled for the entire course or a longer time period (e.g., a week). The advantageous "anytime, anywhere" feature of asynchronous communication makes it unavoidable in online education. Students with other obligations such as family and work may still participate on weekends, at night or in small chunks throughout the day since all

communication is stored (Haythornthwaite & Kazmer 2002). However, this feature may in some cases be disadvantageous since the postings can be accessed by all participants including the teacher and create a fear of public ridicule (e.g., Contreras-Castillo et al. 2004).

SMU Multi-Modality Program of SMU Junior HS and Science High School

In response to the New Normal in the educational landscape brought about by the COVID- 19 crisis, Saint Mary's University Junior High School and Science High School resiliently adopts a flexible learning modality for school year 2020-2021 called SMU Multi-Modality Learning Program (SMLP). SMLP uses multiple flexible learning modalities like modular and technology- aided instruction delivered initially via Distance Learning or Independent Learning offline and online until the government allows the conduct of Face-to-Face Delivery of Instruction in School.

With the help of the home and community, the school closely monitors the implementation of the SMLP to ensure the continuity of delivering excellent Catholic education to students in the midst of crisis while keeping the learners' safety of paramount importance. The features of the SMU SMLP are as follows:

1. CLASS SCHEDULE, SUBJECT TEACHERS & CLASS ADVISERS
    1. Like in the traditional classroom set up, a class schedule will be followed and a subject teacher is assigned per subject. The class schedule shall be strictly followed to avoid overlapping and procrastination in the accomplishment of learning activities and desired output.
    2. The subject teachers will exhaust all means to give input and closely monitor the learning activities to ensure that students are on task as scheduled.
    3. A class adviser is assigned to help in the shepherding of learners, monitoring their learning participation and gathering of feedback from parents/ guardians and students.
2. BASIC COMMUNICATION PLATFORM FOR INDEPENDENT LEARNING: GCAI/ GMAI
    1. While students are at home for Independent Learning, the basic communication platform between them and their teachers is the group chat for academic interactions (GCAI) or group message for academic interactions (GMAI).
    2. The Class Advisers will create the GCAI/ GMAI. The purpose for such should be made clear to students in the group.
    3. All subject teachers will be added to the class GCAI/ GMAI.
    4. The GCAI/ GMAI is primarily for sending information/ activities and general reminders. It is also a platform for student-friendly discussions between the teacher and the students
    5. Sending and discussion of activities and general reminders should be done by the subject teachers in the GCAI/ GMAI following the daily class schedule.
    6. Reminders/ follow up on non-compliance, inactivity, non-participation etc. should be done through pm/ text/ call/ email or any individualized electronic means to the student concerned and his/ her parents/ guardians for protection of privacy.
    7. Answering of student queries could be done in the GCAI/ GMAI if it concerns all; otherwise, it will also be done through pm/ text/ call/ email or any individualized electronic means for protection of privacy.
3. MODULAR & TEXTBOOK-BASED INSTRUCTION (MTI)
    1. Independent Learning Activities (ILA) such as reading texts, written exercises or drills, learning packages, manageable performances will be given to students. These shall be accomplished at home according to the class schedule.
    2. The textbooks shall be the main reference material for ILA. Teacher-made worksheets/ activity sheets and modules will also be used.
    3. All ILA shall be individualized. Allowed activities that require group interaction are those that will only involve the members of the household (e.g Family Disaster Plan for AP; Hazard Mapping at Home (Science); Rosary Praying (CFE); Cookery, Housekeeping (TLE), etc.). However, for group activities initially done last school year and are expected to be completed this school year (e.g. Science Research and Statistics, Science

Research, Practical Research 2), group interaction may be done via zoom, messenger, text, call, email.

4. ILAs are both formative and summative in nature, depending on the purpose and nature of the ILA.
5. The list of Independent Learning Activities together with electronic resources such as videos, PowerPoint, presentations, tutorials etc. will be sorted in folders and will be saved to the students' flash drives on a designated schedule.

4. TECHNOLOGY- ASSISTED INSTRUCTION (TAI)
    1. To help students understand complex competencies/ lessons, subject teachers will prepare podcasts and/ video recording of themselves teaching or explaining the lesson or demonstrating an activity using a specific format.
    2. Subject teachers may also use other electronic resources like downloaded video clips, audio recording, PowerPoint etc. as supplementary materials.
    3. All technology-assisted resources shall be prepared collaboratively by the subject teachers during the PANAGSAGANA (INSET) and to be checked by the Subject Area Coordinators and the Principal.
    4. These electronic instructional materials will be saved in the students' flash drives on a designated schedule to address the concern of those who have difficult or no internet connection. These will also be uploaded to SMU LMS for those with internet connection.
5. ONLINE INTERACTION AND SERVICES
    1. In its aim of providing online connectivity to learners, SMU is making negotiations with some companies to provide free internet access to students without internet connections.
    2. Google Classroom, Messenger Chat, Zoom, and the like could be used by teachers for supplemental synchronous or asynchronous interaction for those who have net connectivity.

Teachers' and Students' Readiness in Science Teaching and Learning Using the Blended learning

The National Academic of Sciences (2020) stated that teaching and learning in a modern classroom is no longer an act of transferring knowledge. Further, the act of teaching has become a multidisciplinary enterprise to develop critical thinking, interaction, and collaboration among learners. Given these multidisciplinary changes in curriculum and its relative learning objectives, the need to collaborate in order to create learning environments has gained momentum in this decade or so. Instead of teacher-centered approaches, the focus has shifted to learner-centered and learning-centered strategies. In the current educational landscape, learners are no more the empty vessels to be filled in, rather they need to be the co-creators of knowledge; they should be willing to take ownership of their learning and contribute to the development of knowledge.

The implementation of blended learning became inevitable in the teaching and learning process of universities, where one would "redefine higher education institutions as being learning centered, and facilitate a higher learning experience" (Garrison & Kanuka, 2004, p. 104). However, the e-learning readiness of students must be taken into consideration in the movement towards a blended learning model of instruction. It would be unwise for universities to impose a blended learning environment on students without first identifying their readiness and needs (Adams etal, 2018).

The findings of the study of Adams et al (2018) revealed a moderate level of e-learning readiness, which suggests the importance of making students aware of the technology in e-learning, and the availability of technological resources. As such, future studies could involve larger sample sizes to ensure the data are presentable and generalizable. Furthermore, interviews are needed to explore further the possible reasons to explain such findings. In consideration of these findings, higher education institutions should have a re-prioritization of fund allocations towards identifying students' characteristics, and their readiness for a blended learning environment. Future blended learning research may look more specifically into how pedagogy and course designs affect students' current engagement in a blended learning model of instruction. Besides that, what specific blended learning strategies are most effective for different subjects or fields of study, and the various learner types would be valuable areas for exploration. In addition, support systems and training programs need to be in place to ease the transitional process from traditional methods to a blended learning model of instruction (Rasouli, Rahbania & Attaran, 2016).

Instructors must know how to be facilitators of learning, assessors of student competencies, and advocates of self-explored learning (Kumar, 2017).

Similar results were found by Mondal, Majumber, and Mandal (2019) when they studied the effect of blended learning strategy for secondary science students. Based on the study, learning style does not have influence on the students' critical thinking, problem solving, science process skills and science achievement after being exposed to blended learning strategy. However, the effective blending of online learning with face-to-face instruction can improve higher order thinking and science learning among secondary school students. Moreover, blended learning strategy is considered as one of the new initiatives of pedagogical approaches for integrating ICT in science education. Even the University of Dares Salaam in Tanzania, which have been implementing blended learning programs for over five years, a study made by Mtebe & Raphael (2013) still have found out some challenges that need to be resolved to realize the expected benefits. Challenges include outdated learning resources, unavailability of instructors during online sessions & under-utilization of LCs, and technical difficulties. In addition, Raymond (2019) found in his study entitled, High School Teacher Perceptions of Blended Learning, that high school teachers' positive views of the usefulness of technology had a direct correlation to their attitude toward adapting blended learning pedagogy. Participants acknowledged the importance of electronic technology in the classroom. Hinkhouse (2013) investigated blended learning in the high school science classroom, found out that students preferred the access of self- paced content in the online modules even though they were not motivated to complete the assigned modules.

Other factor may impact student learning is their readiness to learn in the middle grades employing blended learning. Sriwichai (2020) explored the students' readiness for learning English course through blended learning environment and investigate problems and challenges that the students faced in their learning. Findings revealed that students' readiness for learning English through blended learning was at slightly high level. They tended to be able to learn English through the combination of two different learning modes. They believed that learning English in face-to-face classroom and online learning mode motivated them to be more self-disciplined and responsible for their own learning, and encouraged them to set up their own English learning plans and learning goals. However, the major problems and challenges the students confronted in learning included losing focus on learning in classroom due to considerable class size, limited access of online lessons caused by Learning Management System (LMS) severe crash, difficulty of online interaction with teachers and classmates, lack of experience and skills for digital tools, and time management for two learning modes. Further, Larsen (2012 investigated how to best train the teachers in BL pedagogy and online teaching technology and a measure of the students' perceptions of the BL environment with respect to its productiveness. The study sought to discover how students experienced the teacher's practice and behavior and the extent to which these factors affected student perceptions of the course and BL environment in general. Findings indicated that the teachers needed a fairly minimal amount of pedagogical and technical training to employ BL successfully. Collaborative planning also proved very beneficial, together with technical and pedagogical support throughout the semester. Students were found to work more autonomously and focused while becoming more responsible for their own learning. This enabled the teachers to better provide personalized assistance, keep better track of student progress, and cover more materials. Students also liked learning in the BL environment and indicated they would prefer this to more conventional classes. Lastly, teacher practice and behavior were found to have minimal influence on student perceptions of the BL environment though some results suggested that teacher experience might be a predictor of student satisfaction with their teachers.

On the other hand, various studies have found that teaching strategies has considerable impact on their achievement outcomes (Schmid et al., 2014). Researchers have investigated the pedagogical and theoretical aspects of technology integration (Mantri, Dutt, Gupta & Chitkara, 2008) wherein they found that there are mixed effects of technology integration on student learning outcomes. Further, they have found that higher levels of collaboration and cooperation among students could be achieved by employing technology to enable, support and facilitate discussions (p. 321). Schmid et al. (2014) explored the impact of technology-enhanced instruction in postsecondary education and reported that learning is best supported when students are engaged in active and meaningful exercises via technological tools that provide cognitive support. (p. 285). Al-Fahad (2009) found that somehow, a large number of students have available mobile phones and that these mobile phones can be used to enhance the students' learning by providing timely information. Further, his study confirmed the importance of mobile devices for its flexible

availability, improving the communication between students and teachers. According to Baepler, Walker, and Driessen (2014), in an active learning classroom, student faculty contact could be reduced by two-thirds and students achieved learning outcomes that were at least as good, and in one comparison significantly better than, those in a traditional classroom (p. 227). Borokhovski et al. (2016) tried to map out the added value of planned collaborative activities versus unplanned grouping of students in the context of postsecondary education. They reported that the designed- based treatments outperformed contextual treatments on measures of achievement and they strongly suggested the value of planning and instructional designing in technology integration in post-secondary education (p. 15).

Likewise, Nguyen (2017) conducted a study on online learning activities on learning outcomes of students who participated in the blended learning course, focusing specifically on skill-based courses. The learning outcomes or results of a learner are usually measured by scores, knowledge or skills gained in the course. In blended learning courses, the learning outcomes can be assessed according to many criteria. In this study, interactive activities such as teacher–student interaction, student–student interaction, student–content interaction and student–technology interaction are considered. Undergraduate students participated in the blended learning course in which formative assessment was used to evaluate student learning outcomes by the combination of different learning activities through a learning management system. The quantitative results obtained by using regression analysis of data from the system showed that the students who effectively interacted with learning activities in the course have better results. Quantitative analytical results indicated that student–student interaction has a greater impact on student learning outcomes. These learning activities are used for interactive activities as suggestions for teachers to design and implement learning activities for blended learning courses. Though Kyndt et al (2013) have explored the effects of face-to-face cooperative learning in this regard, few studies has attempted to investigate the effect (s) of asynchronous learning on student performance in both online and face-to -face modes collectively across varied levels of formal education and subject domains.

In the work of Perveen (2016), e-language learning analytics based on the constructivist approach of collaborative construction of knowledge was assessed. The findings revealed that asynchronous e-language learning was quite beneficial for second language (L2) learners, but with some limitations which could be scaffolded by synchronous sessions. Based on the findings, the researcher suggested a blend of both synchronous and asynchronous paradigms to create an ideal environment for e-language learning in Pakistan. Similar study was conducted by Malik et al. (2017) on the students' preferences to use asynchronous and synchronous e-learning resources. Findings revealed statistically significant difference in students' responses regarding effectiveness of synchronous and asynchronous e-learning activities. Male students preferred synchronous as well as asynchronous e-learning activities more than female students at higher education level. Students were found to have greater interest in synchronous activities when they had credit in terms of marks.

Moallem (2015) stated that the emergence of the newer web synchronous conferencing has provided the opportunity for a high level of students to students and students to instructor interaction in online learning environments. However, it is not clear whether absence or presence of synchronous or live interaction will affect the learning processes and learning outcomes to the same extent for all learners with various characteristics, or whether other factors that compensate for the absence of the live interaction can be identified. The researcher investigated whether various communication methods (synchronous, asynchronous and combined) impact factors such as self-regulation, social presence, immediacy and intimacy, collaboration and interaction and learning process and outcomes. Multiple sources of data were used to test the consistency of the findings and to examine various factors across different communication methods. The results suggest that factors other than communication methods maybe responsible for learner self- regulation. There is, however, a relationship between student satisfaction, perception of social presence and immediacy and communication methods. The synchronous and combination methods appeared to provide the highest level of social presence followed by the cognitive and emotional support.

Politis and Politis (2016) worked on the relationship between an online learning environment (synchronous), which is supported by Blackboard Collaborate, and the skills and traits of knowledge acquisition, assessed the influence of online learners' motivation on knowledge acquisition skills and traits, and proposed alternative Blackboard Collaborate layout and structure derived from the process of a critical reflection. The study revealed three major findings. First, easy access of the Blackboard

Collaborate and an effectively designed structure enhanced learners' problem understanding and communication. It also improved the personal traits of conceptualization, tolerance and amiability that are essential for knowledge acquisition. Second, the readiness of the online learners with educational communication technologies had a positive influence on their liberal arts knowledge. Third, learners' attested motivation to embark on synchronous online classes enhanced their knowledge acquisition skills and traits. Finally, alternative Blackboard Collaborate layouts and structures are recommended aiming at encouraging future researchers to further investigate the relationship between the knowledge acquisition skills and traits of learners and an online synchronous learning environment.

Another case study on Asynchronous Discussions & Assessment in Online Learning made by Vonderwell, et.al. (2007) indicated that there are several dimensions that affect students learning and assessment through online discussion. Self-regulatory cognitions, learner autonomy, writing skills and structures can affect the assessment activities and assessment as a process.

In the Philippines, Lim (2017) emphasized the advantages of asynchronous communication tools. One of the advantages mentioned is that its availability anytime and anywhere. Because students can access these tools 24/7, it provides them more time to study and reflect on the topics of discussion. The modern learning management systems incorporate various asynchronous communication tools in order to have evidences of collaboration which may form part of the grading system. This type of communication is very useful even if there are too many students in the online classroom. The sad part here is that, some students may not get immediate feedback thus prolonging their agony in unclear terms. Learners may have the tendency to be irregular in participation and sometimes students that are not well disciplined may tend to copy paste some assignment from the internet, thus making them liable for plagiarism. Written ideas may sometimes be interpreted, and again it's hard to get immediate feedback for clarification purposes. Other researchers also showed the effectiveness of modular method. The work of Sadiq, Sadia, and Zamir (2014) have found that modular teaching is more effective in teaching-learning process as compared to ordinary teaching methods because in this approach, students learn at their own pace. On the other hand, Duyan, & Victorio (nd) suggested that modularization promotes positive changes on students' attitude towards teaching and learning. Their study found that modular teaching is more effective than traditional teaching method in the teaching -learning process of chemistry lesson namely gases and their applications. This may account to the fact that modular teaching provides students opportunity to learn at their own pace according to their level & needs. In their study, it was recommended that chemistry teachers should be provided with training in module writing and teaching.

Furthermore, student readiness to learn and teacher competence are linked. In a survey of 42,754 high school students, Yazzie-Mintz (2010) reported a majority of students stated that material presented in class was not interesting, which contributed to their disengagement in class. Further, 35 percent of the students surveyed stated their boredom stemmed from a lack of interaction with their teacher. Both the student's readiness to learn and the teacher's competence is essential to student learning. Hence, it is also crucial to determine the readiness of the teachers in engaging in to the new normal learning education methodologies. How competent are these teachers to deliver the skills and knowledge intended to their students? The pioneering innovation of virtual communication and community requires both teacher and student to engage, interact, and contribute to learning in new ways. The challenge is that simply providing opportunities for interaction and collaboration does not provide assurance that students will approach their learning in deep and meaningful ways. The role of learner in blended learning environments constitutes multiple roles and responsibilities. This creates role complexity, as participants must assume varying degrees of responsibility to monitor and regulate the dynamics of the learning community (Graham, 2013).

Teachers' and Students' Attitude towards the New Normal Learning Modalities

Despite the current pandemic hampered education all over the world, virtual learning and ease of access to internet services highlight facilitated the learning system. Schools, colleges, universities, and instructors instantly adopted online sources to continue their educational journey through video conferencing applications and modules (International Labour Organization, 2020). As noted by (Habes et al., 2019), improved communication technologies mostly facilitated the learning systems as accessibility to social media is a useful source of information and communication. Both students and teachers consider online technology as a positive part of their learning system. Even besides online sources, many countries also launched television broadcast to support distance

learning during the pandemic (UNHCR, 2020). For (Sultan Alam, 2020), prioritizing distance learning, primarily through online systems, is a "paradigm shift in education." The jammed wheels of education raised certain uncertainties regarding the future of students, but it also highlighted the significance of technology in our lives. In this regard, (Muhaisen, 2020) also considered online learning as a useful tool to overcome educational challenges. Generally, both students and teachers are equally responsible to accept online learning which helps to continue the learning process as access to education is today more convenient through online learning systems (Ali, 2019). However, many argue that the current crisis is not a normal shift from formal to informal education rather, it is an educational crisis as well. Thus, if tackled strategically, this urgent shift can bring several positive outcomes for both the students and the instructors (Adnan, 2020).

Manlangit, Paglumotan, & Sapera (2020) stated that attitude can alter every aspect of a person's life, including their education. The student attitudes on learning will determine their ability and willingness to learn. Apparently, if the student have a negative attitude towards the education are not altered, a student is unlikely to continue his education beyond what is required. Such that, it is also considered that if a student have negative attitude towards the new normal learning modalities, their education will not be changed or altered and vice versa. Thus, crucial role of teachers in this time of pandemic is to changing students' negative attitudes towards learning and convey them to be of positive attitude towards the new normal learning modalities. Likewise, a very significant consideration that needs to be addressed is determining the factors driving the attitude and using this information to bring about change specially these students are more of self-paced condition. This can affect their performance in the course. Celik, Birol and Huseyin Uzunboylu (2015) made a comparative study on High School Students' Attitude Towards Distance Education in 2015, where they found that internet usage increasing in the year 2014 causes neither positive nor negative attitude towards learning when compared to year 2010. This is caused by fast change in the usage aims of internet. Moreover, the use of technology is also important to be considered such that this study deemed to. Misbah, et al. (2017) recommends that advance education establishments must give serious attention to providing adaptable online opportunities.

Tang, Chung Meng & Lee Yen Chaw (2013) found out in their study that students having positive attitude towards online learning, study management, online interaction and learning flexibility are more likely to adapt to blended learning. Kazu and Demirkol, (2014) studied the effect of blended learning environment model on high school students' academic achievement where they found that the students who are exposed to blended learning are academically more successful than students who have studied in traditional learning environment. It was also found out that the academic success of the students who were exposed in blended learning in which online learning and face to face learning environment, is higher.

Adesope, and Ahiakwo (2016) studied the Perceptions of Educators on Modular Object- Oriented Dynamic Learning Environment (MOODLE), an open-source learning management system. Adesope and Ahiakwo found out that this learning system benefits educators and help them collaborate with students effectively. However, the provision and maintenance of internet connectivity when using this mode was a recommendation.

Pfiffner et al. (2013) conducted a study of 17 girls and 40 boys in second through fifth grades in order to determine how direct parent intervention and involvement improved attentiveness of students and increased performance on academic tasks. They report that structured support at home leads to greater student behavioral and academic outcomes. However, in this time of pandemic, it is very crucial to understand the readiness of the students in the new normal learning education which is blended learning. It is also important to determine how do students apt to the new learning methodologies like modular and online teaching and learning.

In a longitudinal study of 3,649 middle grades students, Orthner et al. (2013) discovered that between sixth and eighth grades, the measures of psychosocial engagement declined in most students. One factor that countered the decline in psychosocial engagement was the presence of teachers who provided a meaningful context for the students. In those cases, student engagement did not decline but instead was maintained at higher levels. Lounsbury (2017) argued that engaging students in their learning perpetuates principles of democracy that are crucial for their education. Lounsbury also stated that building relationships with students is particularly important in the middle grades.

The SMU Multi-Modality was piloted this S.Y. 2020-2021 as contained in the Learning Continuity Plan duly submitted and approved by the Department

of Education. Accordingly, from all the gaps presented and discussed, there is an apparent need for a framework to prepare teachers and students in learning science effectively through blended learning This study was conceptualized then to determine the teachers' and students' readiness on blended learning. Moreover, the challenges encountered and their interventions conducted were mapped out in this study. From the data that were gathered, a proposed blended learning framework in science was formulated.

Methodology

Research Design

This study employed a descriptive-survey research design that aimed to determine the readiness, struggles, and breakthroughs of the teachers in the blended learning modalities.

Participants

Purposive sampling was employed in the selection of respondents. All students were invited to access the google form but their participation was voluntary. The research instruments were crafted using google form and then were sent to the class GCAIs during the science subject schedule of the teachers. The student participants were given adequate information about the study and their parents' consent have been obtained. In addition, the data was also treated with utmost confidentiality.

Furthermore, all science teachers were advised to participate in the research survey. All of the science teachers have experienced teaching both in face-to-face and blended learning modalities in the junior high school level handling science subjects.

Research Instrument

The research survey instrument adapted from Juan (2021) was utilized to determine the readiness, struggles, and breakthroughs of teachers in the blended learning modalities. This survey questionnaire consisted of three parts. The first part was all about the profile of the respondents. The profiles enlisted the respondents' gender, grade level, and subjects they were teaching. Evaluation of the teachers' readiness in blended learning modalities was the second part. This consisted of six dimensions; classroom learning, online learning, online interaction, technology, learning management, readiness for blended learning. The questions adopted a Likert scale which consisted of 4 measurement scales, where 4= "Strongly Agree", 3 = "Agree", 2= "Disagree" and 1= "Strongly Disagree." The third part of the questionnaire pertained to the struggles and breakthroughs of the teachers in blended learning modalities. It consisted of open- ended questions to enable the respondents to give answers on their own words.

Data Gathering Procedure

The researchers sought the approval of the school principal. Thereafter, the questionnaire was distributed via google form to make it more convenient to gather from the respondents following the mandate on COVID-19 health protocols. The gathered data were automatically entered to the database as soon as they finished answering. The data gathered were collated and subjected to descriptive statistical treatment.

Results and Discussion

Level of Students' Readiness using Blended Learning Modalities

Respondent's Profile

Table 1. *Available Gadgets at Home*

Gadgets	*f*
PC	13
Laptop	35
Mobile phone	45
Tablet	14
TV	23
TOTAL	130

The 49 respondents have identified which gadgets are available in their own homes. One student can identify more than one gadget which explains why the total of the frequency is more than the number of respondents.

Based from Table 1, mobile phone is the most available gadget, followed by laptop, TV, tablet and PC, respectively. The gathered data implies that each student has at least one available gadget that they have in their home. And that, the others have even multiple gadgets. It shows that based on availability of

materials, the learners are ready for the blended learning. Though, one limitation of the data is that sharing of gadgets with siblings/cousins/relatives were not looked into.

The Level of the Students' Readiness in the Blended Learning Modalities

Table 2. *Readiness of Students in Blended Learning Modalities along the Six Dimensions*

No	*Dimensions*	*Mean*	*QD*
1	Classroom learning	3.14	High
2	Online learning	2.33	Low
3	Online interaction	2.79	High
4	Technology	3.11	High
5	Learning Management	3.03	High
6	Readiness	3.11	High
	Overall Mean	2.92	High

Table 2 reveals that generally, the level of readiness of the students in blended learning modalities is high, with an overall mean of 2.92. Among the six dimensions, five dimensions have high level of readiness, while online learning is the only dimension where level of readiness is considered low (mean = 2.33). This implies that the students prefer more to have face-to-face learning, since their level of readiness for online learning is generally low.

This result is also supported by the fact that Philippines, in general, is not yet ready for online schooling. The country is unable to sustain online education for the majority of its pupils, and the effort will be unsuccessful for the vast majority of the country (Kritz, 2020) especially that e-learning, including blended approaches, is regarded as a means for educational reform, modernization of schools, and increased access to a world-class education (Powell & Barbour, 2011).

Level of Teachers' Readiness Using Blended Learning Modalities

Table 3 below shows the level of readiness of teachers in blended learning modalities along the six dimensions. The overall mean of all dimensions was 3.04 which is described as high. Among the six dimensions, 5 of which have means described to be high and only one is very low. Learning management is the dimension which has the highest computed mean (*mean = 3.46).* On the other hand, online learning obtained the lowest mean (*mean = 2.31).*

Table 3. *Readiness of Teachers in Blended Learning Modalities along the Six Dimensions*

No	*Dimensions*	*Mean*	*QD*
1	Classroom learning	3.24	High
2	Online learning	2.31	Very Low
3	Online interaction	2.80	High
4	Technology	3.44	High
5	Learning management	3.46	High
6	Readiness	3.00	High
	Overall Mean	3.04	High

Based from the table, it can be seen that the level of readiness of the teachers in the classroom setting is much higher as compared to online learning. All other dimensions were high, though it can be observed that the lowest among them is online interaction.

However, the effective implementation of blended approaches is a complex process, especially when aiming for educational change rather than supplementing traditional practices (Davis, 2008). Faculty members do not feel properly prepared to teach online, according to Lichoro (2015). However, identifying skills to educate faculty to teach online remains a priority, and by doing so, proper authorities will be able to provide recommendations on how to do so. Research indicated that some of the main challenges that emerge are linked to students and their readiness to learn in a blended environment teachers and their commitment and capability to effectively teach through blended approaches (Parkes et al., 2011), and school leaders and their provision of adequate support to teachers and students (Stevens, 2011).

Struggles on the Blended Learning Modalities in Science

What are the challenges/difficulties have you encountered in teaching science using the blended learning modalities?

Teachers, when asked about the difficulties they have encountered in teaching science, have varied answers. It has something to do with internet connection, materials/resources used, engagement of the learners to the lesson and use of laboratory for the experiments.

Adesope, and Ahiakwo (2016) found out that learning management system benefits educators and help them collaborate with students effectively. Furthermore, Misbah, et al. (2017) recommends that advance education establishments must give serious attention to

providing adaptable online opportunities. Thus, provision and maintenance of internet connectivity is important.

Catapang suggested also in her paper that by educating, simplifying, and monitoring the use of LMS by the teachers to enhance the current status of classroom instruction.

As compared to face-to-face education, the demands and challenges of online learning is greater (Finch & Jacobds, 2012). In fact, Amro, Mundy and Kupczynski (2015) pointed out that educators in various levels face challenges in meeting the needs of online learning while maintaining students' learning.

What worst experience did you encounter in teaching science using the blended learning modalities this pandemic?

The teacher-respondents also had their share of worse experience even when the class is online. There are specific instances like unresponsive students, difficulty explaining the lesson, unavailability of materials for laboratory works at home and academic dishonesty.

Breakthroughs on the Blended Learning Modalities in Science

From the challenges/difficulties you have encountered in teaching science using the blended learning modalities, what actions have you taken to solve them?

In dealing with the difficulties encountered in teaching science, the teacher-respondents find a new service provider, learn skills in editing and making videos for the students, provide differentiated activities to the learners, benchmark with other teachers about their best practices, communicate with the learners individually when there's difficulty, maximize use of textbook.

How did you manage the worst experience you have encountered in teaching chemistry using the blended learning modalities?

Teacher-respondents learned to handle their worst experience by doing the following: learning to handle the situation at hand, honing their skills in delivering the lesson, providing the video for the lessons, reminding the learners the true goal of education.

What teaching experiences or activities in science using the blended learning modalities do you find best and worth sustaining?

The best and worth-sustaining teaching experiences or activities of the teacher- respondents are the preparation of teacher-videos, and the maximization of the use of the Learning Management System (LMS).

What is/are your best practice/s in coping science teaching using the blended learning modalities?

In coping with science teaching using the blended learning modalities, there are best practices highlighted by the teacher-respondents, like the provision of teacher videos, conducting synchronous zoom meeting once in a while to check on the students, providing a more continuous learning approach, learning to adapt to the challenges of the new normal in education.

Conclusion

Based from the results, the following conclusions were arrived at: (1) Students and teachers are ready to engage in a blended learning environment. (2) Teachers go through various struggles in implementing blended learning modalities. These difficulties have different effects in their teaching and it has challenged them to think of ways to maximize the learning of students. (3) The struggles of teachers in teaching science using the blended learning modalities are varied. (4) The teachers are innovative in finding ways to provide pro-active solutions in delivering their lessons in a blended learning environment.

The following suggestions were formulated to further improve the study: (1) Teachers who struggle in carrying out differentiated learning can use effective groupings based on what resources are available to students, their geographical locations, their interests, knowledge or skills and devise project-based activities consolidating long-term learning objectives instead of providing short -term tasks which might be burdensome for their learners and for the teachers as well, considering the frequency of the repetitive cycle of sending, fetching and marking students output in just a short period of time. (2) The school administration should provide skill-enhancing seminars along instructional material planning and designing, so as to equip teachers the necessary skills crafting instructional materials that can meet the demand of the current situation. Furthermore, the school should see to it that teachers have reliable internet connection since the delivery is greatly internet-dependent. (3) Teachers who cannot carry out

successful synchronous classes due to connectivity problems of students or both can resolve this by sending hyperlinks along with instructions to their students and encourage independent learning. (4) There should be more students and teachers as respondents to make the findings more generalized. Open-ended questions should also be asked to the student-respondents.

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