


## Article

# The Challenges of Modular Learning in the Wake of COVID-19: A Digital Divide in the Philippine Countryside Revealed

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**Abstract:** The coronavirus pandemic (COVID-19) is a global health crisis that has affected educational systems worldwide. North Eastern Mindanao State University (NEMSU), a typical countryside academic institution in the Southern Philippines, did not escape this dilemma. The advent of remote learning to continue the students' learning process has caused difficulties for both the students and the educational institutions. Thus, we conducted this study to assess the students' level of submission of assigned tasks from printed remote learning modular materials under the College of Teacher Education of NEMSU. We evaluated whether the distance of students' residences to the campus or the nearest online learning facilities affects the level of modular task retrievals. We also determined the current situation, challenges, and struggles of the students with remote learning. Our results showed that out of 392 printed learning modules sent to Bachelor of Elementary Education (BEED) students, 299 or 76% were retrieved. There were also 292 Bachelor of Secondary Education (BSED) students who received the learning modules, and 237, or 81%, complied with their tasks. We found that 68% of the total number of students reside within a <30 km radius, while 32% were within a 30–40 km radius. We also found that the distance of their residences from the NEMSU campus slightly affected the percentage of modular learning material retrievals for both the BEED and BSED students, with  $R^2 = 0.38$  and  $R^2 = 0.07$ , respectively. Nonstructured interview results showed that most students were constrained by many challenges and struggles in complying with the tasks. These include internet connectivity problems, inadequate learning resources, difficulty understanding the module contents and assessment instructions, overloaded remote learning tasks, poor learning environment, and mental health problems. This study also revealed that the country's digital divide became more apparent as we navigated this new mode of the remote learning system.

**Keywords:** COVID-19; pandemic; modular learning; remote learning system; Philippines

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## 1. Introduction

The coronavirus pandemic (COVID-19) has become a global health crisis. As of October 2021, almost 238 million people have been infected, and over 4.8 million have died [1]. In the Philippines, COVID-19 has infected 2,654,450 individuals and resulted in 39,505 deaths [1]. This pandemic has disrupted all levels of education worldwide [2], suspending classroom teaching in almost all schools throughout the world [3,4]. This disruption in classes was intended to ensure the safety of students and educators [5] and curb viral transmission in higher education institutions. In the Philippines, classes at all levels were suspended in mid-March of 2020, when the Philippine government ordered the lockdown of its largest island Luzon and other major cities [6]. As a result, more than a billion learners have been affected worldwide, with more than 28 million Filipino learners staying home to comply with the government's quarantine measures [7]. However, with the Philippine Department of Education's mandate to continue the learning activities even in

times of crisis, whether it be a “calamity, disaster, emergency, quarantine, or even war” [8], students must still be taught even when at home.

Most educational institutions across the globe need to end face-to-face education and continue through online courses, affecting more than 90% or nearly 1.5 billion students worldwide [9]. Studies have shown that teachers mainly use online video conferencing platforms such as Zoom, Google Meet, Microsoft Teams, and WhatsApp, which contribute to the flexibility of online teaching and learning [10–14]. In a global study conducted by Vincent-Lancrin et al., 2022 [9], they reported that many countries have set up multimodal infrastructures to include a variety of technologies such as online platforms accompanied with TV/radio education, paper learning packages handed or mailed to students, digital learning resources provided on memory sticks or CD-ROMs, TV, radio, and digital resources on online platforms working with phone and internet services, through to the direct use of mobile phones. Examples from the mentioned study include (1) in Mexico, they developed *Aprinde en Casa*, which mainly drew on audiovisual content broadcast across a network of TV stations and streamed through internet platforms, and they delivered 300,000 printed educational materials to students from rural, isolated, and indigenous communities; (2) In India, the state developed digital and nondigital programs under the campaign “#ab padhai nahi rukegi” (# learning will not stop) to ensure learning continuity during school closures; (3) In Spain, the Ministry of Education launched a web portal, *Aprindo en casa* (Learn at home), bringing together educational resources, online training, tools, and apps.; (4) TV materials were made available to teachers and students in Finland; and (5) The Ministry of Education in France supported learning with a variety of learning resources delivered online and by mail, as well as on TV and radio. Organizations belonging to the global “Teach for all” network developed different initiatives such as in Chile, Columbia, and Peru [9]. Since March 2020, online Edcamps have supported many teachers to learn about and share their experiences with teaching remotely during the COVID-19 crisis, as exemplified in Ukraine and the United States [9].

Many tertiary institutions have had to adapt and innovate to sustain the learning process amid the crisis, especially the 3.5 million tertiary-level students enrolled in approximately 2400 higher education institutions (HEIs) in the Philippines [4]. HEIs have designed various forms of learning schemes for the continuance of education despite the closure. The Philippines’ Commission on Higher Education (CHED) released a marching order for all HEIs to continue to deploy any available flexible learning and other alternative modes of delivery in lieu of campus learning [15].

One of the immediate modifications made is through online learning, e.g., synchronous, real-time lectures and time-based outcomes assessments, or asynchronous, delayed time activities, such as prerecorded video lectures and time-independent assessments [16–20]. This provides a temporary feasible alternative for education practitioners to perform instruction and provide students with necessary instructional support [21]. However, these modalities can be prepared more easily by the top-tier universities in the country, viz., De La Salle University (DLSU), Ateneo de Manila University (ADMU), the University of Santo Tomas (UST), and the state-run University of the Philippines or any of the private HEIs. Unfortunately, various state-run universities struggle to adopt this online learning, especially in the countryside.

Online learning is faced with multiple challenges [22] by students and lecturers. Many students struggle to adapt to the rapid advances of technology in today’s digital age [23], especially in the low-class barangays, municipalities, and provinces. In this context, online learning reveals a digital divide among Filipino students [24], exacerbating existing inequalities and may translate to barriers in online education [25].

In a Philippine-wide study, authors reported that 32% and 22% of 3670 Filipino students surveyed have difficulties adjusting to new learning styles and do not have reliable internet access, respectively [2]. Other studies have also revealed that students are confronted with difficulties in online learning due to inadequate learning resources, electric power interruptions, vague learning contents, overloaded lesson activities, limited teacher

scaffolds, poor peer communication, conflict with home responsibilities, poor learning environment, financial related problems, physical health compromises, and mental health struggles [25]. Thus, despite the efforts to make education accessible for all, many difficulties are still confronting Filipino university students in the practice of distance education.

One of the state-run universities in the Southern part of the Philippines is North Eastern Mindanao State University (NEMSU). As a small countryside university, most of its students face challenges with the online learning system. Thus, teachers are seeking a more flexible way to continue educating their learners. Therefore, the search for a more viable remote learning modality other than online learning was explored. Many authors have suggested other means of distance learning, such as using cell phones and (SMS) texting technology to facilitate learning [26]. Others have urged to employ TV programs, radio broadcasts, and other non-internet-based media [27]. Modular learning is another option in addition to online learning. With modular learning, class modules are printed out for students to study independently and submit to teachers for grading. Using one or a combination of these flexible learning schemes, students are offered options to follow. This idea of flexible learning is more encompassing than online learning. Online learning requires an internet connection, whereas learners do not necessarily require connectivity in a flexible learning modality. Flexible learning focuses on designing and delivering programs, courses, and learning interventions that address the learners' unique needs in terms of pace, place, process, and products of learning" [16,28–30].

Given the limitations posed by the learners, NEMSU thus adapted either fully online or blended flexible learning by utilizing online options coupled with the delivery of printed modules to students. The goal is to bring education to those who are unreachable, under-resourced, less privileged, and inaccessible. This flexibility gives students more freedom to actively participate in learning [19,31,32].

Therefore, this study tries to examine the level of responses of NEMSU College of Teacher Education students to blended learning modalities and identify barriers confronting them in submitting homework and tasks from printed modules. We also evaluated whether the distance of students' residences to the campus or the nearest online learning facilities affects the level of modular task retrievals and the ability of students to comply with the tasks. Results will help improve the currently used learning schemes and develop effective teaching interventions to boost student motivation to learn amidst the pandemic.

## 2. Materials and Methods

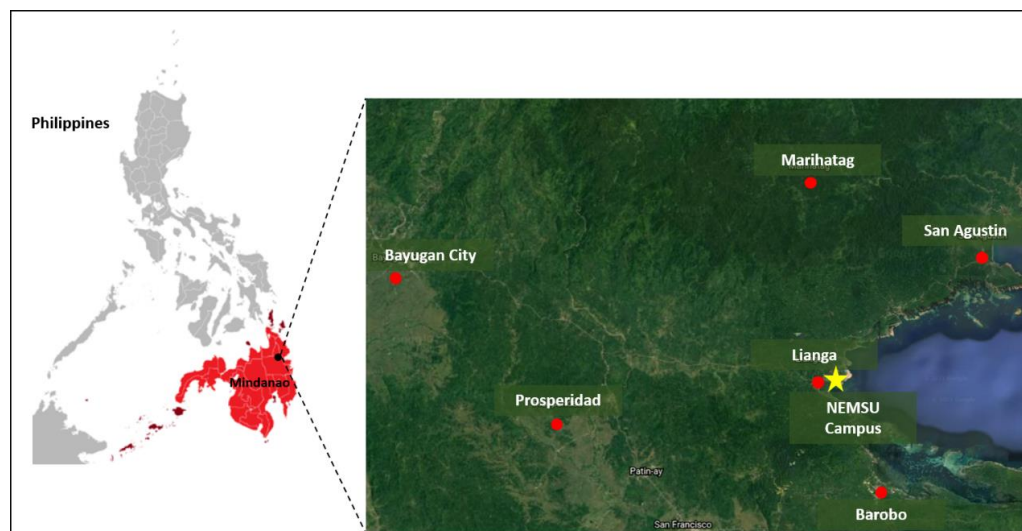
### 2.1. The Study Coverage

This study covered the residences or locations of the first-year- to fourth-year-level Bachelor in Elementary Education (BEED) and Bachelor in Secondary Education (BSED) of NEMSU—Liangsa Campus, Lianga, Surigao del Sur, Philippines (Figure 1). BEED has a total of 392 enrollees, whereas BSED has 292 students. These BEED and BSED students live sporadically across six municipalities and 23 barangays within Surigao del Sur and Agusan del Sur provinces. All students enrolled in BEED and BSED programs were involved in this study.

### 2.2. Learning Module Distribution and Retrieval

Learning modules are printed materials prepared by the instructors on a given course. These learning modules contain paper hand-outs for the topic, usually accompanied by learning tasks at the end (e.g., quizzes/long exams, self-reflections, literature searches, video recordings, or paper printouts on simple experiments, etc.). Learning modules are prepared flexibly; students can learn by themselves through these printed modules or listen to the online lectures/resources relative to the topic (aside from the hand-outs) to reinforce the learning process. Instructions to access the online resources were incorporated into the modular learning materials. Internet access is necessary if students seek online lessons but is not a must-to-do. Although the online option gives more convenience, traditional paper print options were encouraged given the students' diverse socioeconomic backgrounds.

Thus, all students will receive the printed learning modules regardless of how they prefer to learn the topic or submit the given tasks. In total, there were 684 printed modules delivered during the course of this study.



**Figure 1.** Location map of drop-off points of learning modules covering six municipalities within the province of Surigao del Sur and Agusan del Sur, North Eastern Mindanao, Philippines.

Learning modules were prepared and distributed/retrieved bi-monthly, giving the students two weeks to learn from the module and accomplish their tasks. Distributors (usually instructors) for each municipality dropped these learning modules in designated areas. Dropping and retrieval points are mostly the barangay halls (a barangay is the smallest government unit in the country). The students will collect their modules, learn by themselves and submit any prepared questionnaires as an assessment within two weeks through online submission or printed copies. Thus, students drop their answered modules every two weeks and obtain another set of learning materials at the same dropping/pick-up points. Designated distributors will retrieve the accomplished printed modules while bringing along a new set of modules that will run for another two weeks. This cycle continues as long as the ‘stay from home’ order is in effect.

Upon retrieval of the learning modules, students are then characterized by sex, location, course program, and educational level. These were the common demographic information contained in the modules prepared by individual instructors. The proponents were unfortunately restricted from adding more profile information in the learning modules.

Due to COVID restrictions and pandemic health and safety protocols, this study was constrained to only one distribution and retrieval cycle covering from 16 to 30 August, 2021. We analyzed the data and came up with an ‘opportunity study’. This study therefore does not constitute a thorough data collection process due to certain limitations and some impositions from the Health Department due to the pandemic. Nevertheless, this study presents essential information necessary to identify barriers and recommend innovative solutions as we navigate to these new learning modalities amid the COVID-19 pandemic experienced in the countryside.

### 2.3. Follow-Up Interviews

A short field interview was conducted with 84 total students. We drew a 10% sample population (54 out of 536) from those who were able to submit their assigned tasks. Since our focus was more on the barriers that hinder students from submitting the assigned tasks, we interviewed approximately 20% (30 out of 138) of those noncompliant students. Brief field interviews were performed from September to October 2021 using the prepared short

questionnaires (Supplemental Material S1). All barriers to submission or nonsubmission were consolidated to support the analysis. COVID-19 pandemic protocols were observed during the interview. Interviews by phone or through Zoom or Microsoft Team platforms were also conducted for those students that reside in areas with transportation limitations or in those localities with high COVID-19 cases whereby mobilities were restricted and lockdowns were strictly enforced. Participants' informed consent was requested before an interview starts. In the case of interviews by phone or online platforms, the interviewer read the informed consent, and approval was obtained by asking with a 'yes' or 'no' answer.

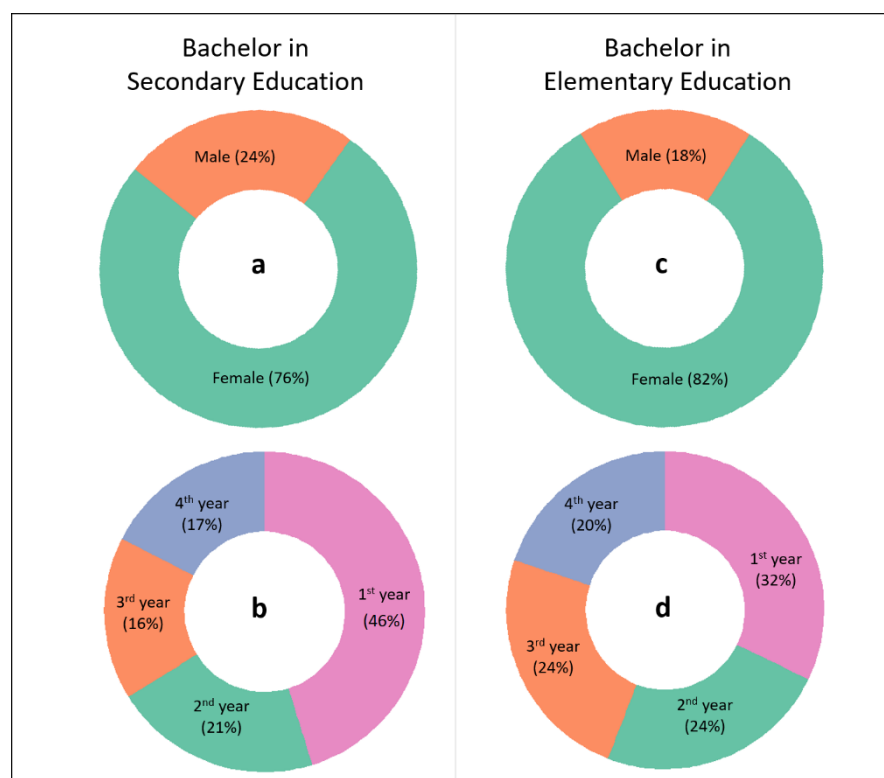
#### 2.4. Data Analysis

Descriptive analyses (e.g., frequency, percentages) were used to analyze the demographic profiles and to determine the level of retrieval of learning modules. Clustering was prepared using the *dendextend* and *k-means* clustering packages. Regression analysis was carried out using the *ggplot2* and *dplyr* functions. We used R version 4.0.2 in all graphical presentations, regression, and clustering analyses (R Core Team, 2020, version 4.0.2, Vienna, Austria) [33].

### 3. Results

#### 3.1. The Education Program Students

There were 292 students enrolled under Bachelor of Secondary Education (BSED), while 392 were registered under Bachelor of Elementary Education (BEED). The majority of the students in both courses were female (BSED = 76%; BEED = 82%, Figure 2a,b). BSED and BEED were 4-year courses under the NEMSU's College of Teacher Education. Among the enrollees, first-year students have the highest population, with 45% for BSED and 32% for BEED. Yet, the number of students declines towards the higher year levels (2nd, 3rd, and 4th years), dropping by 17–21% for BSED and 20–25% for BEED (Figure 2c,d).

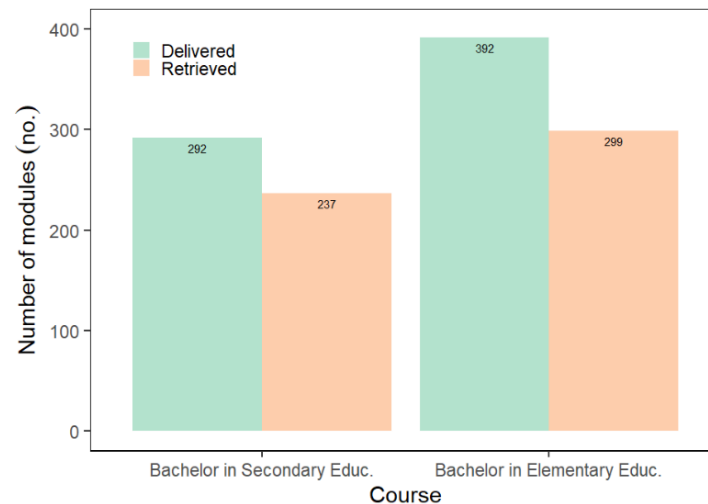


**Figure 2.** Sex aggregation and enrollment per year level of Bachelor of Secondary Education and Bachelor of Elementary Education students of North Eastern Mindanao State University. (a,c) are the percentage population according to sex while (b,d) are the percentage population by year level in college.



### 3.2. Learning Module Delivery and Retrieval

Out of 292 learning modules delivered for BSED students, only 237 or 81% were retrieved (Figure 3), whereas only 299 or 76% BEED students submitted their learning modules out of 392 students enrolled in this program. The BEED retrieval percentage was lower by 5% than the BSED retrieved learning modules, but they are not statistically different ( $p > 0.05$ ).



**Figure 3.** Total delivery and retrieval of learning modules prepared for Bachelor of Secondary Education and Bachelor of Elementary Education students of North Eastern Mindanao State University.

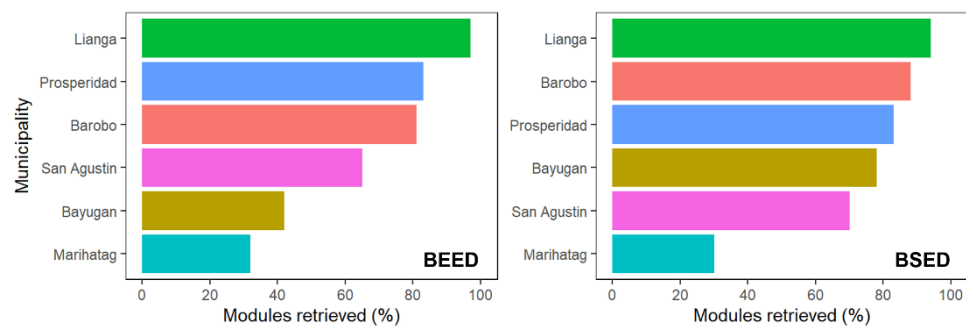
### 3.3. Retrieved Learning Modules by Municipality

The municipality with the highest retrieved learning modules for the BEED course was Lianga, with 97% module retrieval (126 out of 130 modules; Table 1, Figure 4). However, the least collected modules came from Marihatag, with only 32% module retrievals (8 out of 25 modules). For the BEED students, the municipality of Lianga had the highest recovery of learning materials (94%) after having retrieved 75 out of 80 modules delivered (Table 1, Figure 4). It must be noted that NEMSU's campus is located in Lianga, thus this high retrieval from this municipality is not surprising. Overall, the average learning module collection per municipality was 67% for BEED and 74% for the BSED students.

**Table 1.** The number of printed learning modules delivered and retrieved, percent retrieval, and the approximate distance of the municipalities to the North Eastern Mindanao University Campus in Lianga, Surigao del Sur, Philippines.

| Municipality | BEED                    |                         |             | BSED                    |                         |             | Approx. Distance from the Campus (km) |
|--------------|-------------------------|-------------------------|-------------|-------------------------|-------------------------|-------------|---------------------------------------|
|              | Modules Delivered (No.) | Modules Retrieved (No.) | % Retrieval | Modules Delivered (No.) | Modules Retrieved (No.) | % Retrieval |                                       |
| Barobo       | 70                      | 57                      | 81          | 50                      | 44                      | 88          | 20                                    |
| Bayugan      | 47                      | 20                      | 42          | 45                      | 35                      | 78          | 50                                    |
| Lianga       | 130                     | 126                     | 97          | 80                      | 75                      | 94          | 0 *                                   |
| Marihatag    | 25                      | 8                       | 32          | 20                      | 6                       | 30          | 30                                    |
| Prosperidad  | 55                      | 46                      | 83          | 70                      | 58                      | 83          | 40                                    |
| San Agustin  | 65                      | 42                      | 65          | 27                      | 19                      | 70          | 20                                    |
| Total        | 392                     | 299                     |             | 292                     | 237                     |             |                                       |

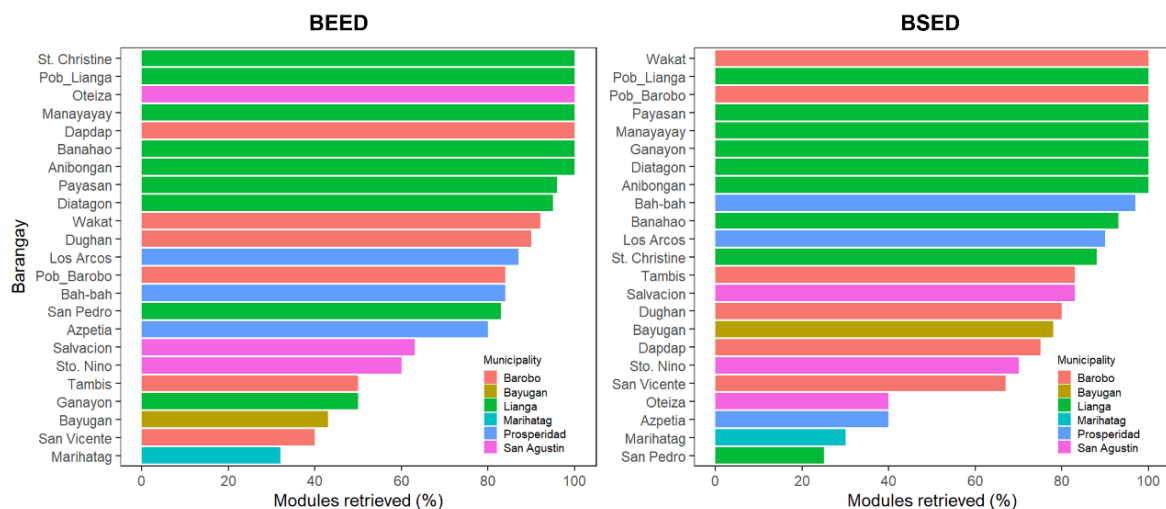
\* NEMSU campus location.



**Figure 4.** Percent module retrieval per municipality as submitted by Bachelor of Elementary Education (left panel) and Bachelor of Secondary Education (right panel) students of North Eastern Mindanao State University, Philippines.

### 3.4. Retrieved Learning Modules by Barangay

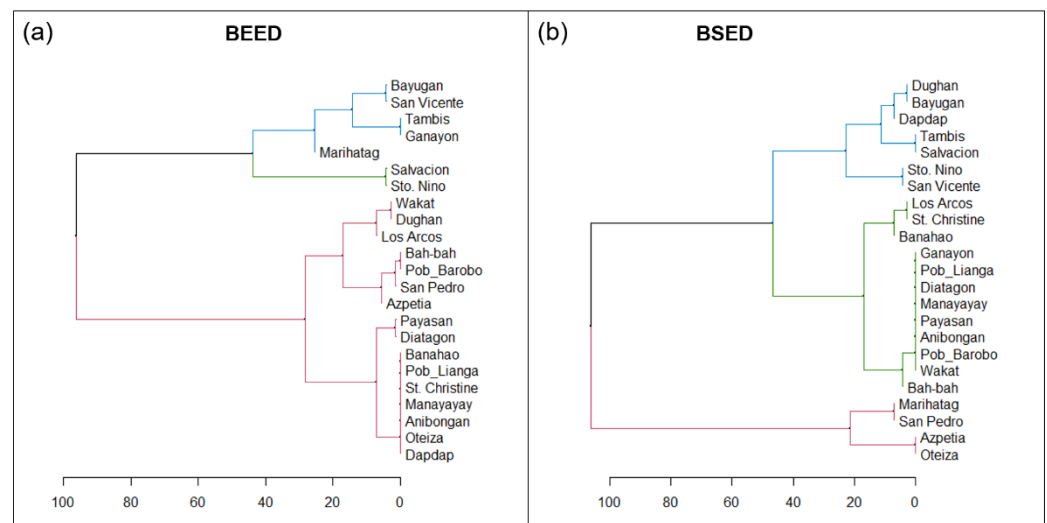
Figure 5 presents the distribution of barangay where the students reside and the percentage of retrieved modules per barangay. The municipality with the most barangay drop-off and collection points was Lianga, with nine barangays. Barobo followed with six barangays. San Agustin and Prosperidad municipalities both had three barangays. Marihatag and Bayugan had only one barangay distribution and collection center.



**Figure 5.** Percent module retrieval per barangay as submitted by Bachelor of Elementary Education and Bachelor of Secondary Education students of North Eastern Mindanao State University, Philippines. Bar color represents the municipality where that barangay belongs.

The highest learning module collection from the BEED course came from the barangays of Lianga (Poblacion Lianga, Banahao, St. Christine, Manyayay, and Anibongan), Barobo (Dapdap), and San Agustin (Oteiza) with 100% retrieval percentage. The lowest came from the Marihatag proper (32%). Similarly, barangays under Lianga municipality (Poblacion Lianga, Ganayon, Manyayay, Payasan, and Anibongan) and under Barobo (Poblacion Barobo, and Wakat) were the barangays with 100% retrieval percentage under the BSED students. Surprisingly, San Pedro, a barangay from Lianga, also got the lowest percentage retrieval (25%) within the BSED group (Figure 5).

Grouping barangays into three clusters showed the affinities or similarities of barangays for each subset (red, green, and blue; Figure 6). This hierarchical clustering depicts submission levels for each barangays and identifies the closest barangays with similar module submission levels that combine them into one cluster.

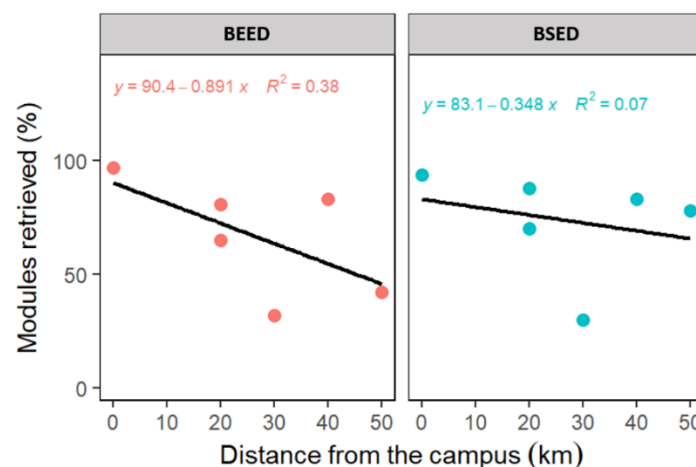


**Figure 6.** Hierarchical clustering of barangays showing the similarities among the barangays. The similarities were based on the retrievals of learning modules submitted by Bachelor of Elementary Education (a) and Bachelor of Secondary Education (b) students of North Eastern Mindanao State University, Philippines.

In terms of BEED students, Marihatag proper stood out with fewer similarities to other barangays. It must be noted that Marihatag had the least level of submission, with only a 32% module submission percentage (Figure 5). The rest of the barangays are more or less closer to each other on either blue or red clusters. Within the BSED group, the red cluster group is composed of the barangays with the least submission levels (Poblacion Marihatag, San Pedro, Azpetia, and Oteiza), as depicted in Figure 5.

### 3.5. Relationship between the Percentage of Module Submission and the Distance of Student Residences

Overall, 68% of the total number of students for both BEED and BSED reside within a <30 km radius, while 32% were within a 30 km–50 km radius. The distance of the students' residences from the campus mattered mostly for the BEED students ( $R^2 = 0.38$ ), whereas the module submission level by BSED students was less likely to be affected by the distance of their residences to the campus ( $R^2 = 0.07$ ), likely due to the fact that online and other learning resources are also available (Figure 7).



**Figure 7.** Relationship between the percentage of module retrieval and the distance of student residences from the NEMSU campus, Philippines.



### 3.6. Challenges Encountered upon Submission or Nonsubmission of the Assigned Tasks

Around 83% (45 out of 54) of those students who submitted their assigned tasks and were interviewed responded that poor internet connectivity was the most challenging issue in doing their tasks (Table 2), whereas around 15% reported that mental health problems were one of the difficulties they experienced upon accomplishing their assigned homework.

**Table 2.** The total number of students, total submissions and nonsubmissions, the number of students that were interviewed, and the percentage of responses on the challenges encountered and reasons for nonsubmission of assigned tasks from the printed modular learning material delivered to the BEED and BSED students of North Eastern Mindanao State University. The interviewees were allowed to choose as many challenges they encountered.

|  | Total Students |      |       | Total Submissions    |      |       | Students Interviewed |      |       | % Response (Based on the Total Interviewees) |
|--|----------------|------|-------|----------------------|------|-------|----------------------|------|-------|--|
|  | BEED           | BSED | Total | BEED                 | BSED | Total | BEED                 | BSED | Total |  |
|  | 392            | 292  | 684   | 299                  | 237  | 536   | 30                   | 24   | 54    |  |
| Challenges upon submission of assigned tasks |                |      |       |                      |      |       |                      |      |       |  |
| Poor internet connectivity                   |                |      |       |                      |      |       | 25                   | 20   | 45    | 83   |
| Inadequate learning resources                |                |      |       |                      |      |       | 20                   | 16   | 36    | 67   |
| Vague task instructions                      |                |      |       |                      |      |       | 18                   | 12   | 30    | 56   |
| Overloaded learning tasks                    |                |      |       |                      |      |       | 21                   | 14   | 35    | 65   |
| Poor learning environment                    |                |      |       |                      |      |       | 15                   | 8    | 23    | 43   |
| Mental health problems                       |                |      |       |                      |      |       | 8                    | 5    | 13    | 24   |
| Others                                       |                |      |       |                      |      |       | 5                    | 3    | 8     | 15   |
|  |                |      |       | Total nonsubmissions |      |       | Students interviewed |      |       | % response                                   |
|  |                |      |       | BEED                 | BSED | Total | BEED                 | BSED | Total | (based on the total interviewees)            |
|  |                |      |       | 93                   | 55   | 148   | 19                   | 11   | 30    |  |
| Reasons for nonsubmission of assigned tasks  |                |      |       |                      |      |       |                      |      |       |  |
| No or slow/unstable internet                 |                |      |       |                      |      |       | 17                   | 10   | 27    | 90   |
| Frequent power interruptions                 |                |      |       |                      |      |       | 15                   | 9    | 24    | 80   |
| Inadequate support to learn                  |                |      |       |                      |      |       | 12                   | 7    | 19    | 63   |
| Vague task instructions                      |                |      |       |                      |      |       | 10                   | 8    | 18    | 60   |
| Peer communication issues                    |                |      |       |                      |      |       | 14                   | 7    | 21    | 70   |
| Too many household chores                    |                |      |       |                      |      |       | 15                   | 9    | 24    | 80   |
| Communications costs                         |                |      |       |                      |      |       | 13                   | 8    | 21    | 70   |
| Overloaded learning tasks                    |                |      |       |                      |      |       | 16                   | 9    | 25    | 83   |
| Poor learning environment                    |                |      |       |                      |      |       | 11                   | 7    | 18    | 60   |
| Mental health problem                        |                |      |       |                      |      |       | 9                    | 9    | 18    | 60   |
| Others                                       |                |      |       |                      |      |       | 7                    | 5    | 12    | 40   |

Out of the 30 students that were interviewed for the nonsubmission of their assigned tasks, 27 of them, or 90%, reported that either no internet access or slow/poor internet connectivity was the main reason for not submitting their assigned tasks (Table 2). They also mentioned that frequent power interruptions (80%), overloaded learning tasks (83%), and too many household chores (80%) hindered them from accomplishing their assignments.

Indeed, the challenges faced by those who could submit their assignments and the reasons for nonsubmission by other students overlap. However, the percentage of those who were affected most was greater in those groups of students who were unable to comply than those who were able to submit their assigned tasks (Table 2).

## 4. Discussion

### 4.1. Education Program Enrollees

Most of our Education Program students were female (BSED = 76%; BEED = 82%, Figure 2a,b). A study conducted in the Philippines for Bachelor of Education students also revealed a higher proportion of female students than male students, suggesting that females may dominate the educational process and are more inclined to learn than their male counterparts [34].

We also observed a declining rate of Education Program enrollees towards their higher year levels, dropping by 17–21% for BSED and 20–25% for BEED, which is not surprising. As students progress towards a higher year level, this declining enrollment rate can be construed as both institutional and student behaviors. For example, students would respond to costs as they climb up the academic ladder of their studies. There will be more demands and requirements from the course that entail costs. This is apart from the school fees, board and lodging, commuting, and other school-related expenses. Peace and order situation is also a factor. In addition, sudden changes in student plans may occur due to the local/national economy changes affecting them (e.g., recession). A decline in enrollment may also be due to declining job market opportunities that force some students to change their course. This COVID-19 pandemic is expected to decrease the university enrollment as well.

A study in the Philippines also showed that identified factors affecting attrition and retention rates such as the first-year transition into higher years include academic advising, career planning and placement, learning assistance/academic support, mentoring, faculty development, financial aid, cocurricular programs, and other services [35]. These, if not given enough attention, could have a significant effect on the enrollment statistics of the university. Hopes for higher retention rates rely on the concerted efforts between academic and administrative units and individual faculty members, and academic support groups [35,36].

### 4.2. Module Retrievals by Municipalities or Barangays

Most of the municipalities in this study belonged to third to fifth class municipalities, meaning poor-income municipalities, and so with the barangays within each municipality. Students within these locations may have electricity and low technology access, but little to no internet. They struggle to submit their task from the given modular learning materials provided by the instructors. These municipalities include Marihatag, Barobo, Bayugan, San Agustin, which also showed students with a low percentage of submission of modules (Figure 5).

While a blended option combining online and printed modular materials is feasible under these municipalities, this learning system, in most cases, uses internet connectivity, instant messaging, or even listening to real-time virtual lectures that will aid the students in understanding the lessons clearly. These require access to the internet, virtual communication systems, and text messaging approaches that are not necessarily available to the BEED and BSED students of NEMSU, especially those in the uplands.

Unlike the more prominent state-run universities in urban cities, where internet access is very accessible to the students, this study indirectly provides scenarios whereby the digital divide between the main cities and the countryside becomes apparent.

### 4.3. Relationship between the Percentage of Module Submission and the Distance of Student Residences

Surigao del Sur, where the NEMSU campus is located, is one of the less privileged provinces in the Philippines. Compared to the suburban and major cities, living in the rural area or upland areas is a major factor contributing to the student's submission of modular learning materials during the COVID-19 pandemic period. Usually, many students would seek the facilities within the NEMSU campus to access the free internet to comply with the learning tasks. Most students also try to access the university libraries and on-site learning

resources or seek the help of other students and friends to comply with their tasks assigned by the instructors. Many of these students reside up to 50 km away from campus vicinities. Thus, the slight decline in modular learning material submission with the distance of the students' residences must be due to these reasons, as mentioned earlier. Apart from that, the fear of COVID infection, the practicality of going to the campus, and transportation problems might also drive this decline in modular submission with the distance of the students' residences to the campus.

#### *4.4. Challenges in the Submission and Reasons for Nonsubmission of the Assigned Tasks*

Random interviews of BEED and BSED students revealed their challenges in accomplishing their tasks and why some students could not comply with the assignments as instructed in the learning modules. Around 90% of the interviewees who had not complied with the tasks reported internet connectivity as the main reason for noncompliance. They found it challenging to perform literature searches and other online resource usage using the internet. It must be noted that Surigao del Sur and its neighboring provinces are low-income provinces, and most of the barangays are remotely situated. Internet signals are very unstable, especially during heavy downpours. More often, there is also power interruption that adds to the burden on the students. A BSED student from barangay Azpetia under the municipality of Prosperidad claimed that the internet is accessible at all in their village of only a few dozen people, and power interruption is an almost daily occurrence. To do her tasks, she needed to go down to the town proper and look for internet cafes, which adds to the expenses of struggling parents, some of whom were jobless due to the COVID pandemic closing of business establishments. This problem has been reported in other countries like Pakistan and Iran where students reported electric power interruption and limited internet access made remote learning very challenging [37,38], especially in remote areas of Nepal, Iran, and Malaysia [39–41] where students have difficulty to stay connected with online learning due to power interruptions or even lack of electricity. Similar internet connectivity problems were also experienced by those interviewees (83%) who could comply with their assigned tasks but struggled due to poor internet access. They complained that it takes time to finish their homework often due to online connection interruption. The internet signal is intermittently lost amid their work, making them do the task repeatedly until they get an excellent internet signal. One of the students from San Pedro even stated that she had to sit on the rooftop of their house to get a good internet signal and work from there. In developing countries, the gap in access to information and communication technologies between the haves (the privileged class) and the have-nots (the underprivileged class) is rather wide [42]. In Europe, access to remote learning varied between near-universal Slovenia, where fewer than 2% of the students could not be reached, while in Italy, 48% of the students were left without education [43]. Ultimately, the gap between pupils from more affluent and from disadvantaged backgrounds worldwide has widened [44–46].

Another reason is the lack of resources to support the remote learning process. Around 63% of the total students being interviewed reported that they had no personal computers to do the assigned tasks or no printers to print their assignments. A BEED student from Dapdap of the municipality of Barobo complained that they even had difficulty finding food for their meals, how could they then manage to purchase a personal computer. Students' participation in online learning without adequate technology is highly unlikely compared with their peers to whom more resources are available [47]. It would have been beneficial if the university could provide e-learning facilities and equipment to lessen the burden on the students. However, most universities, especially in the countryside, do not have a properly functioning e-learning system that students can use [48,49]. University instructors also find it challenging to operate these e-learning systems if available [50], thus making it more complicated for both the learners and the instructors.

Studies have shown that students are having difficulty coping with remote learning due to poor communication and insufficient support and channels to communicate [2] among peers or to the teachers. In a study in the US, remote learning resulted in lower

levels of engagement among students, mostly relative to access to high-speed internet and internet-enabled devices and staying socially connected to others [51].

In barangay Diatagon of the municipality of Lianga, a BEED student criticized that some of the contents in the learning module are hard to understand. Sometimes the instructions are vague, and they need to contact the instructors or their peers for clarifications. This entails communication costs (mobile phone, internet access, cellphone loads). Communication issues influence students' motivation to learn [49].

Most of the students interviewed for nonsubmission (83%) claimed that they were overloaded with many modules, one instructor after another. These modules contain daily and weekly assignments. An overwhelming number of activities reduce the motivation of the students to learn, and students can end up complying with the tasks without learning. This situation is often confounded when household chores are added to the burden. Around 80% of those noncompliant students that were interviewed complained that they have also delegated responsibilities at home, making it more challenging to cope with multiple tasks. A report stated that university students in Malaysia expressed stress about the overwhelming number of tasks required by the university instructors [37]. This difficulty creates a huge impact on the stress and anxiety levels of the students, brought about by the large number of modules they need to answer and comply with [38]. Disruption in answering modules often occurred in remote learning because students need to participate in doing household chores [2]. This problem influences university students' academic performance and achievement [51,52].

Interestingly, 85% of those respondents who reported to be more stressed due to multi-tasking at home were female students. In a study conducted in India, Pakistan, Bangladesh, Nepal, and Afghanistan, it was shown that female students are more often placed lower in the digital divide access scale. It further stated that female students reported more stress due to added household responsibilities that impacted their learning outcomes [53]. Accordingly, females faced more 'hurdles to access to education and inherent biases and socio-cultural norms', which can get further exacerbated in times of crisis [46]. This was particularly given emphasis when referring to a digital gender divide where underlying gender-based digital discriminations occurred due and women's ability to benefit from emergent digital opportunities are curtailed [54]. A study across five developing countries (Bangladesh, Brazil, Chile, Ghana, and the Philippines) suggests gender divisions are often due to infrastructural issues, patriarchal attitudes, and caste-based traditions [55]. However, in an Austrian secondary school, it showed higher perceived teaching support and learning engagement among females than males [56].

Around 60% of the students also reported that a poor learning environment made it difficult for them to comply with the assigned task. A student from Poblacion Barobo said that, unlike the campus environment, she could hear loud annoying videoke (music) entertainment from her neighbors. Some neighbors are noisy in whatever forms, be it barking dogs, the sound of chicken clucking, vehicular noise nuisances', babies crying, and other distractions. All these affect the ability of the student to concentrate at home. These disturbances ended in noncompliance with the tasks. Poor learning environments are affecting the ability of the students to learn comfortably [25]. This has long been a problem in distance education [2], especially in most poor households. If this problem persists, productivity and the utmost concentration of students are at stake, as what happened in China [57,58].

A total of 18 out of 30 noncompliant students found it difficult to navigate the new learning format due to mental health problems. A student in Oteiza, San Agustin, revealed difficulty coping with the COVID pandemic affected her mental health. Overloaded tasks coupled with stress and anxieties brought about by COVID took a toll on her. Students were not used to being alone and confined in the house most of the time. This mental struggle affects the mindset leading to less focus and even considering giving up on remote learning.

#### 4.5. Limitations

This study has some limitations. First, the number of interviewees was limited due to the COVID-19 pandemic restrictions and lockdowns. Most interviews were conducted by phone and zoom or Microsoft Teams platforms. Second, the study is limited to a single printed learning material delivery and retrieval cycle due to difficulty in mobility and the challenges in internet connectivity. Third, the in-person respondent selection was a product of self-selected sampling considering that some areas were too restricted to conduct the interview whereby random sampling cannot be applied. Fourth, the data gathered were not exhaustive and failed to capture the broader assessment of the students' conditions. For example, contextual variables such as income, family status, peer pressures, student-teacher interactions, health conditions, socioeconomic status, pandemic-related public services available, university-led interventions, and other aspects affect the assignment submissions but were not asked. Local authorities limit the in-person contacts, while phone interviews must be short due to expenses to be incurred for phone interviews.

Despite these constraints, this study has several strengths. The pandemic-induced school closures provided an excellent opportunity to examine basic information on the challenges behind these emergency learning approaches that were helpful in administering immediate fine tuning of the schemes and planning for initiatives in bridging the digital divide and setting gender-sensitive learning policies amid the pandemic.

#### 5. Conclusions

North Eastern Mindanao State University, a typical countryside academic institution in the Southern Philippines, did not escape from the impact of COVID-19 on its students. This study on the assessment of learning module retrieval from BSED and BEED students of the university provides insights into the challenges and struggles of the students with remote learning. The problems faced by the students are enormous and include inadequate learning resources, difficulty understanding the module contents and assessment instructions, overloaded remote learning tasks, poor learning environment, and mental health problems. However, challenges connecting to the internet seemed to have the largest impact.

Although faced with challenges during the data collection due to pandemic restrictions, our study is the first in Mindanao Island and one of the first few investigations in the Philippines that identified the barriers associated with remote learning amid the pandemic. We recommend that as we move along with the new mode of learning, the government education department may consider redirecting their resources into improving the efficiency of the learning environment, on top of the most apparent issues on internet problems in the rural setting. After all, learning must continue despite this very challenging time of COVID-19, no matter what.

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## References

1. Worldometer. Coronavirus Update. Worldometer. 2021. Available online: <https://www.worldometers.info/coronavirus/> (accessed on 10 October 2021).
2. Baticulon, R.E.; Sy, J.J.; Alberto, N.R.I.; Baron, M.B.C.; Mabulay, R.E.C.; Rizada, L.G.T.; Tiu, C.J.S.; Clarion, C.A.; Reyes, J.C.B. Barriers to Online Learning in the Time of COVID-19: A National Survey of Medical Students in the Philippines. *Med. Sci. Educ.* **2021**, *31*, 615–626. [CrossRef] [PubMed]
3. Ahmed, H.; Allaf, M.; Elghazaly, H. COVID-19 and Medical Education. *Lancet Infect Dis.* **2020**, *20*, 777–778. [CrossRef]
4. Joaquin, J.J.B.; Biana, H.T.; Dacela, M.A. The Philippine Higher Education Sector in the Time of COVID-19. *Front. Educ.* **2020**, *5*, 576371. [CrossRef]
5. Muller, D.; Parkas, V.; Amiel, J.; Anand, S.; Cassese, T.; Cunningham, T.; Kang, Y.; Nosanchuk, J.; Soriano, R.; Zbar, L.; et al. Guiding principles for undergraduate medical education in the time of the COVID-19 pandemic. *Med. Teach.* **2021**, *43*, 137–141. [CrossRef]
6. Bautista, D.; Lopez, M.L. Timeline: How the Philippines Is Handling COVID-19. 2020. Available online: <https://www.cnnphilippines.com/news/2020/4/21/interactive-timeline-PH-handling-COVID-19.html> (accessed on 30 September 2021).
7. UNESCO The Socio-Cultural Implications of COVID-19. 2020. Available online: <https://en.unesco.org/news/socio-cultural-implications-covid-19> (accessed on 30 December 2021).
8. Department of Education. *Learning While Staying at Home: Teachers, Parents Support DepEd Distance Learning Platform*; Department of Education: Pasig, Philippines, 2020.
9. Vincent-Lancrin, S.; Cobo Romani, C.; Reimers, F. (Eds.) *How Learning Continued during the COVID-19 Pandemic: Global Lessons from Initiatives to Support Learners and Teachers*; OECD Publishing: Paris, France, 2022. [CrossRef]
10. Destianingsih, A.; Satria, A. Investigating students' needs for effective English online learning during COVID-19 for Polbeng students. *ELT-Lect. Stud. Perspect. Engl. Lang. Teach.* **2020**, *7*, 147–153. [CrossRef]
11. Hamid, S.M. Online digital platforms during covid-19 in EFL classes: Visual impairment student' perception. *ETERNAL* **2020**, *6*, 328–339. [CrossRef]
12. Wong, J.O. A pandemic in 2020, Zoom and the arrival of the online educator. *Int. J. TESOL Stud.* **2020**, *2*, 82–99.
13. Almekhlafy, S.S.A. Online learning of English language courses via blackboard at Saudi universities in the era of COVID-19: Perception and use. *PSU Res. Rev.* **2020**, *5*, 16–32. [CrossRef]
14. Nartiningrum, N.; Nugroho, A. Online learning amidst global pandemic: EFL students' challenges, suggestions, and needed materials. *ENGLISH FRANCA Acad. J. Engl. Lang. Educ.* **2020**, *4*, 115–140. [CrossRef]
15. Commission on Higher Education. *COVID-19 Updates*; CHED Advisory: Quezon, Philippines, 2020.
16. Ali, W. Online and Remote Learning in Higher Education Institutes: A Necessity in Light of COVID-19 Pandemic. *High Educ. Stud.* **2020**, *10*, 16. [CrossRef]
17. Oztok, M.; Zingaro, D.; Brett, C.; Hewitt, J. Exploring Asynchronous and Synchronous Tool Use in Online Courses. *Comput. Educ.* **2013**, *60*, 87–94. [CrossRef]
18. Hooks, B. *Teaching Community: A Pedagogy of Hope*; Psychology Press: New York, NY, USA, 2003.
19. Guri-Rosenblit, S. 'Distance Education' and 'e-learning': Not the Same Thing. *High. Educ.* **2005**, *49*, 467–493. [CrossRef]
20. Owusu-Agyeman, Y.; Amoakohene, G. Transnational Education Delivery in Ghana: Examining the Benefits, Challenges and Future Prospects. *Pol. Rev. High. Educ.* **2020**, *4*, 135–163. [CrossRef]
21. Bozkurt, A.; Sharma, R.C. Emergency Remote Teaching in a Time of Global Crisis Due to Corona Virus Pandemic. *Asian J. Distance Educ.* **2020**, *15*, 1–6. [CrossRef]
22. Mateo, J. As Classes Open, 'Learning Crisis' Highlighted with Millions of Students Left Behind. Available online: <https://www.onenews.ph/as-classes-open-learning-crisis-highlighted-with-millions-of-students-left-behind> (accessed on 2 October 2021).
23. Alvarez, A.V. The Phenomenon of Learning at a Distance Through Emergency Remote Teaching Amidst the Pandemic Crisis. *Asian J. Distance Educ.* **2020**, *15*, 144–153. [CrossRef]
24. Santos, A.P. In the Philippines, Distance Learning Reveals the Digital Divide. 2020. Available online: <https://eu.boell.org/en/2020/10/06/philippines-distance-learning-reveals-digital-divide> (accessed on 2 October 2021).
25. Rotas, E.E.; Cahapay, M.B. Difficulties in Remote Learning: Voices of Philippine University Students in the Wake of COVID-19 Crisis. *Asian J. Distance Educ.* **2020**, *15*, 147–158. [CrossRef]
26. Flores, J.B. Virtual Learning Platform with Short Message Service (SMS) Notification. *J. Sci. Eng. Technol.* **2018**, *6*, 82–95.



27. Punzalan, J. Education in the Time of Coronavirus: DepEd Eyes Lessons Via TV, Radio Next School Year. Quezon City, Philippines: ABS-CBN News. 2020. Available online: <https://news.abs-cbn.com/news/04/20/20/education-in-the-time-of-coronavirus-deped-eyes-lessons-via-tv-radio-next-school-year> (accessed on 5 October 2021).
28. Parrocha, A. *HEIs May Hold Limited Face-to-Face Classes in MGCQ Areas*; Philippine News Agency: Quezon, Philippines, 2020.
29. Ramos, A.J.; Nangit, G.; Ranga, A.I.; Triñona, J. ICT-Enabled Distance Education in Community Development in the Philippines. *Dis. Educ.* **2007**, *28*, 213–229. [CrossRef]
30. Biana, H. Reaching the Unreached: Philippine Distance Education and Dislocation. *J. Worldw. Forum Educ. Cult.* **2013**, *4*, 73–84.
31. Daniel, J. Making Sense of Flexibility as a Defining Element of Online Learning. 2016. Available online: <https://teachonline.ca/sites/default/files/toolstrends/downloads/makingsenseofflexibility.pdf> (accessed on 10 October 2020).
32. Baggaley, J. Where Did Distance Education Go Wrong? *Dist. Educ.* **2008**, *29*, 39–51. [CrossRef]
33. R Core Team. *R: A Language and Environment for Statistical Computing*; R Foundation for Statistical Computing: Vienna, Austria, 2021.
34. Galit-Lluz, V. Values and Performance of Teacher Education Students in the University of Eastern Philippines. *Asian J. Educ. Soc. Stud.* **2021**, *14*, 39–46. [CrossRef]
35. Zerna, E.; Cruz, R.; Nuqui, A. Factors Affecting Retention and Attrition Rates of La Consolacion University Philippines: Examining Students' Experiences. *Int. J. Trends Econ. Manag. Technol.* **2014**, *3*. Available online: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.685.2003&rep=rep1&type=pdf> (accessed on 27 May 2022).
36. Castillo, J. Distance Learning? Don't Take Power Availability for Granted. 2020. Available online: <https://mb.com.ph/2020/09/25/distance-learning-dont-take-power-availability-for-granted/> (accessed on 5 October 2021).
37. Sarwar, H.; Akhtar, H.; Naeem, M.M.; Khan, J.A.; Waraich, K.; Shabbir, S.; Hasan, A.; Khurshid, Z. Self-reported effectiveness of e-Learning classes during COVID-19 pandemic: A nation-wide survey of Pakistani undergraduate dentistry students. *Eur. J. Dent.* **2020**, *14*, 1–10. [CrossRef] [PubMed]
38. Sarvestani, M.S.; Mohammadi, M.; Afshin, J.; Raeisy, J. Students' experiences of e-Learning challenges: A phenomenological study. *Interdiscip. J. Virtual Learn. Med. Sci.* **2019**, *10*, 1–10. [CrossRef]
39. Subedi, S.; Nayaju, S.; Subedi, S.; Shah, S.K.; Shah, J.M. Impact of e-Learning during COVID-19 pandemic among nursing students and teachers of Nepal. *Int. J. Sci. Healthc. Res.* **2020**, *5*, 68–76. Available online: [https://ijshr.com/IJSHR\\_Vol.5\\_Issue.3\\_July2020/IJSHR0012.pdf](https://ijshr.com/IJSHR_Vol.5_Issue.3_July2020/IJSHR0012.pdf) (accessed on 30 September 2021).
40. Verawardina, U.; Asnur, L.; Lubis, A.L.; Hendriyani, Y.; Ramadhani, D.; Dewi, I.P.; Darni, R.; Betri, T.; Susanti, W.; Sriwahyuni, T. Reviewing online learning facing the Covid-19 outbreak. *J. Talent. Dev. Excell.* **2020**, *12*, 358–392. Available online: <https://www.iratde.com/index.php/jtde/article/view/281> (accessed on 10 October 2021).
41. Sundarasan, S.; Chinna, K.; Kamaludin, K.; Nurunnabi, M.; Baloch, G.M.; Khoshaim, H.B.; Hossain, S.F.A.; Sukayt, A. Psychological impact of COVID-19 and lockdown among university students in Malaysia: Implications and policy recommendations. *Int. J. Environ. Res. Public Health* **2020**, *17*, 6206. [CrossRef]
42. Venkatesh, V.; Sykes, T.A. Digital Divide Initiative Success in Developing Countries: A Longitudinal Field Study in a Village in India. *Inf. Syst. Res.* **2013**, *24*, 239–260. [CrossRef]
43. European Commission. *Education and Training Monitor 2020*; Publications Office of the European Union: Luxembourg, 2020. Available online: <https://op.europa.eu/webpub/eac/education-and-training-monitor-2020/en/> (accessed on 26 December 2021).
44. Adams, R. Private Schools in England Give Pupils Top Grades in 70% of A-Level Entries. *Guardian*. 2021. Available online: <https://www.theguardian.com/education/2021/aug/10/private-schools-in-england-give-pupils-top-grades-in-70-of-a-level-entries> (accessed on 26 November 2021).
45. Adams, R.A. Level and GCSE Results ow Pandemic Has Widened Inequality. *Guardian*. 2021. Available online: <https://www.theguardian.com/education/2021/aug/12/a-level-and-gcse-results-show-pandemic-has-widened-inequality> (accessed on 26 November 2021).
46. Fazackerley, A. 'I'm Lost': Poorer Pupils Lose University Places after A-Level Grade Surge. *Guardian*. 2021. Available online: <https://www.theguardian.com/education/2021/aug/25/im-lost-poorer-pupils-lose-university-places-after-a-levelgrade-surge> (accessed on 26 November 2021).
47. Krywult-Albańska, M.; Albański, Ł. Gender and Educational Inequalities during the COVID-19 Pandemic: Preliminary Insights from Poland. *Sustainability* **2021**, *13*, 12403. [CrossRef]
48. Kerres, M. Against all odds: Education in Germany coping with COVID-19. *Postdigital Sci. Educ.* **2020**, *2*, 690–694. [CrossRef]
49. Gaur, R.; Mudgal, S.K.; Dharni, I.T.; Sharma, R.; Suyal, N. Barriers encountered during online classes among undergraduate nursing students during COVID-19 pandemic in India. *Int. J. Res. Med. Sci.* **2020**, *8*, 3687–3693. [CrossRef]
50. Domina, T.; Renzulli, L.; Murray, B.; Garza, A.N.; Perez, L. Remote of Removed: Predicting Successful Engagement with Online Learning During COVID-19. *Socius Sociol. Res. Dyn. World* **2021**, *7*, 1–15. [CrossRef]
51. Poncian, P. The Impact of Home Environment on Students' Academic Achievement in Tanzanian Secondary Schools: A Case of Geita Town Council. 2017. Available online: <http://hdl.handle.net/20.500.12661/480> (accessed on 10 December 2021).
52. Amali, I.; Bello, M.; Adeoye, G. Influence of domestic works on female students' academic performance in upper-basic schools in Kwara State, Nigeria. *J. Educ. Dev. Areas* **2018**, *26*, 196–202. Available online: <https://journalsplace.org/index.php/JEDA/article/view/44> (accessed on 15 December 2021).
53. Mathrani, A.; Sarvesh, T.; Umer, R. Digital divide framework: Online learning in developing countries during the COVID-19 lockdown. *Glob. Soc. Educ.* **2021**, 1–16. [CrossRef]

- 
54. Borgonovi, F.; Centurelli, R.; Dernis, H.; Grundke, R.; Horvát, P.; Jamet, S.; Keese, M.; Liebender, A.; Marcolin, L.; Rosenfeld, D.; et al. Bridging the Digital Gender Divide: Include, Upskill, Innovate. Australia: OECD Directorate for Science, Technology and Innovation (STI), Directorate for Education and Skills (EDU) & Directorate for Employment, Labour and Social Affairs (ELS). 2018. Available online: <https://www.oecd.org/digital/bridging-the-digital-gender-divide.pdf> (accessed on 10 December 2021).
  55. Rashid, A.T. Digital Inclusion and Social Inequality: Gender Differences in ICT Access and Use in Five Developing Countries. *Gend. Technol. Dev. Policy Rev.* **2016**, *20*, 306–332. [[CrossRef](#)]
  56. Korlat, S.; Kollmayer, M.; Holzer, J.; Lüftenegger, M.; Pelikan, E.R.; Schober, B.; Spiel, C. Gender Differences in Digital Learning During COVID-19: Competence Beliefs, Intrinsic Value, Learning Engagement, and Perceived Teacher Support. *Front. Psychol.* **2021**, *12*, 637776. [[CrossRef](#)]
  57. Chang, C.L.; Fang, M. E-Learning and Online Instructions of Higher Education during the 2019 Novel Coronavirus Diseases (COVID-19) Epidemic. *J. Phys. Conf. Ser.* **2020**, *1574*, 1–5. [[CrossRef](#)]
  58. Wang, C.; Cheng, Z.; Yue, X.-G.; McAleer, M. Risk management of COVID-19 by universities in China. *J. Risk Financ. Manag.* **2020**, *13*, 36. [[CrossRef](#)]