PANICGOGY EFFECT ON PHYSICAL READINESS, PRACTICALITIES, LIMITATIONS, AND STUDENT ENGAGEMENT DURING EMERGENCY MULTIMODAL REMOTE PHYSICS TEACHING

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ABSTRACT: *This descriptive study explored the panic pedagogy effect on physical readiness, practicalities, experienced limitations, and engagement of students brought about by the sudden pivot from in-person to multimodal remote Physics instruction during the health crisis. Researchers adopted and adapted standardized Likert-type survey instruments to collect data from randomly selected 104 STEM students. Analyses revealed a large extent of physical readiness, limitations, experienced practicalities, emotional engagement, and a considerable extent of cognitive and behavioral engagement. Additionally, analyses also observed positive and negative correlations regarding the extent of physical readiness and experienced limitations to overall student engagement but none regarding experienced practicalities. These suggest that the sudden transition to multimodal remote instruction did not undesirably affect student engagement yet presented opportunities for continual quality improvement to support students' continued self-motivation despite the limitations during catastrophic events.*

Keywords: panicgogy, remote teaching, multimodal physics instruction, physical readiness, physical limitations, practicalities, cognitive engagement, behavioral engagement

1.0 INTRODUCTION

Globally, COVID-19 has resulted in the forced closure of schools. Over 1.2 billion students, ranging in age from elementary to university, are not in school due to this worldwide school closure, which disproportionately affects young people. As a result, there has been a significant change in education with the emergence of e-learning, which allows for remote learning using digital platforms [1]. Once again, global educational systems had to devise innovative strategies to continue providing education amid the pandemic, upholding education as a fundamental human right [2]. After a month of lockdown, many nations tried to resume courses, but they were unsuccessful due to the risks to the students.

Due to an upsurge in confirmed COVID-19 cases, the president of the Philippines also decided to stop education in Metro Manila for all grade levels until March 14, 2020. He extended school till April 14 after declaring a partial emergency in Metro Manila on March 9. The March 16 declaration of an enhanced community quarantine prompted a move and an eventual extension until April 30 to encompass Luzon Island [3]. Ultimately, the president issued the decree "No Vaccine, No Opening of Classes." However, the Department of Education (DepEd) secretary was determined to implement a new standard of care [4]. For the 2020–2021 academic year, DepEd ordered all Philippine academic institutions, both public and private, to create a learning continuity plan (LCP). This strategy plan directs how to conduct classes during a pandemic. All private primary education institutions must create a school plan to meet the minimum health criteria established by the Department of Health's risk-based public health standards for COVID-19 mitigation [5] in addition to the LCP [8], as it is the government's commitment to protecting the health and safety of students, teachers, and school personnel following the Department of Health's (DOH) and World Health Organization's (WHO) health protocols [6–7].

Additionally, according to the LCP guidelines, schools may use one or a combination of the following learning delivery modalities: in-person instruction, blended learning (BL), homeschooling, and distance learning (including online, modular, and TV/radio-based instruction) contingent on the COVID-19 restrictions and the unique context of the learners in the school or community [6]. As a result, DepEd considered face-to-face training when designing the course, evaluating it, and developing the teaching strategies. Face-to-face training would be problematic since in-person instruction was completely unfeasible during the pandemic.

In general, the researchers of this study intended to explore the effect of panic pedagogy on the engagement of senior high school students during emergency distance learning in physics. The corresponding results of this study could serve as a guide for elementary science teachers to improve their teaching approach, method, strategy, technique, and curriculum while using the compassionate teaching framework to improve flexible teaching delivery according to the demands of time, with or without the COVID-19 pandemic. In addition to science teachers, the findings of this study could be helpful to curriculum designers as a basis for contextualizing the current curriculum guide with the new normal for learning. Therefore, this study wanted to help students learn by describing their experiences during emergency distance education to communicate their educational needs and circumstances to the relevant authority.

2.0 METHODS

This study was of a descriptive-correlational type, initially involving 164 STEM students. Unfortunately, only 104 of them fully participated.

This study was conducted in a leading high school in the Cagayan Valley region of the Philippines using an enhanced multimodal learning program. Teachers support instruction with the distribution of flash drive learning packages consisting of textbooks, teacher-produced videos, and a tutorial to students supported by a control matrix showing MELC-based learning standards, learning activities, and assessment details, among others, supplemented by a 30-minute post-synchronous session for student clarification and

questions. Students access learning materials and assessments through the learning management system.

Data were collected primarily through a five-point Likert scale questionnaire with researcher-developed items for physical fitness and experience with limitations and practicality and standardized student engagement items taken from the Composite Student Engagement in the Schools Questionnaire-Engagement Composite (SESQ-ENG) [9] and the General Scale self-efficacy (GSE), Ingram Sense of Belonging Survey, Colorado Learning Attitudes about Science (CLASS) and Papanastasiou survey [10]. The data collection tool has a high-reliability index of 0.844.

Researchers used mean and standard deviation to describe the extent of physical preparedness, limitations, and practices experienced, as well as engagement construct items and qualitatively interpreted using Table 1.

Table 1. Qualitative interpretation guide for the extent of physical readiness, limitations, and experienced practicalities and per engagement construct item.

Mean Score	*Qualitative Interpretation*
1.00-1.79	Very small
1.80-2.59	Small
2.60-3.39	Moderate
3.40-4.19	Large
4.20-5.00	Very large

Alternatively, overall engagement was described in terms of indices using the formula *Engagement Index* = $\frac{Total\ Score \times 100}{highest\ possible\ score}$ and $\bar{x} = \frac{\sum Engagement\ Index\ Scores}{104}$.

Researchers interpreted the obtained indices using the engagement index interpretation guide (*see Table 2*). Moreover, the value for negative items in each category (e.g., CLASS questionnaire) was reversed (5 = 1, 4 = 2, and 3 = constant).

Table 2. Engagement index interpretation guide.

Index Score	*Qualitative Interpretation*
0-33	Very low
34-50	Low
51-66	High
67-100	Very high

3.0 RESULTS AND DISCUSSIONS

Extent of Physical Readiness

Table 3 presents the extent of students' physical readiness while in emergency remote Physics teaching.

Overall and in most items, the qualitative description ratings of the extent of physical readiness in remote physics teaching range from moderate to large. On a closer look, aspects of technology infrastructure availability, literacy and use, and learning motivation scored the higher mean values (Item #3, Item #11, Item #13).

Findings indicated that the students were literate, equipped, and comfortable with online learning applications and tools since they believed that before participating in online activities, they needed to enhance their digital skills [11] and digital resources [12]. Digital abilities are necessary for online learning interactions, and they pave the way for students to transmit information efficiently in both synchronous and asynchronous means [13], as well as an indicator of their academic success [14].

The hasty shift to online learning has provided students with a more independent environment in which they can select to enhance their technical abilities [11]. Findings additionally revealed the fewest difficulties in terms of technical literacy and competency. Several studies demonstrated Gen Z students with excellent technology and digital literacy [15].

Table 3. The extent of physical readiness during emergency multimodal remote Physics teaching.

Items	*Mean*	*SD*	*QI*
1. I feel confident with my knowledge and skills in navigating technological software for online learning.	3.65	0.856	Large
2. I am confident using the Internet (e.g., Google, Bing, Yahoo) to find or gather information for online learning.	3.99	0.876	Large
3. I am confident using online tools (e.g., Facebook Messenger, Viber, Google Mail, Yahoo Mail) to communicate effectively with others.	4.25	0.845	Very Large
4. I carry out my study plan.	3.38	0.872	Moderate
5. I have someone to ask if I need help understanding our lesson.	3.57	0.868	Large
6. I manage my time well.	3.41	0.820	Large
7. I set up my learning goals.	3.76	0.842	Large
8. I have high expectations for my learning performance.	3.74	0.903	Large
9. I can direct my learning progress.	3.42	0.746	Large
10. I am not distracted by recreational online activities while in remote learning (e.g., instant messaging, online/mobile games, Internet surfing).	3.13	0.893	Moderate
11. I am open to new ideas.	4.22	0.788	Large
12. I am motivated to learn.	3.90	0.898	Large
13. I learn and improve from my mistakes.	4.15	0.760	Large
14. I like to share my ideas with others.	3.73	0.916	Large
Overall Physical Readiness	3.74	0.482	Large

Further, distance learning signifies the importance of physical readiness, specifically in terms of digital literacy and acquiring the corresponding technological tools to meet the demands of the course at hand [16]. Hence, if the learners are physically ready for their online courses, they are more likely to be motivated to learn and can successfully and independently carry out their academic tasks.

Aside from the acquired technological resources and capabilities, the current findings also conveyed a moderate to a considerable extent of readiness on items like being able to carry out their study plans, set their learning goals [14], and manage their learning progress, which is an indicator of the learners' cognitive engagement. A cognitively engaged learner is deliberate, strategic, and eager to make the effort required to understand complicated ideas or master complex skills. Studies on cognitive engagement frequently focus on how much students usually devote to learning and whether

they are willing to put in extra effort to improve their grades [17]. Learners' inherent capability to regulate and manage their learning progress and choose their learning techniques by taking advantage of what they saw as a less controlled environment with a variety of options to engage in goal setting, monitoring, regulating, and directing their learning, helped in their performance [13].

Remarkably, Item #5's, to a large extent, categorization highlighted how essential student support is during distance learning. Item #5 also indicates the respondents' sense of belonging, a construct of cognitive engagement, since they seem comfortable seeking academic assistance from others. A sense of belonging is a human need to be a part of a group and positively impacts student motivation, achievement, and general well-being. Previous research has found that engaging with fellow students outside the classroom increases a sense of belonging. Furthermore, previous research links perseverance in a program to peer-group relationships, student-faculty contact, self-efficacy, and overall accomplishment [10]. The said research indicates that learning online requires engagement through a collaborative learning setup among students and teachers since it helps learners adapt to the current learning modality, be acquainted with peers, and still effectively learn and achieve academic success. Online collaborative learning (OCL) is one of the most often used teaching methods in online education. It entails cooperating, exchanging ideas and opinions, gaining a standard grasp of specific themes, and creating collaborative goods. According to some experts, OCL is more than just dialogues and knowledge sharing; it is also an excellent tool for learners to co-create new knowledge and improve diverse abilities through online collaboration. Many people widely see collaborative learning as beneficial in online courses. It improves student-teacher interaction while also creating a sense of social presence. This perception also adds to students' learning and ability to adapt to diverse teaching techniques, which benefits them in understanding the complexity of teaching and increases their desire and satisfaction. Several researchers have studied participants' enjoyment of the OCL experience and found it influenced by group members' familiarity with peers, instructor support and feedback, and reliable and easy-to-use technology [18]. The said findings go to show that learning cannot solely be carried out by students alone but also by participating in collaborative learning experiences with peers and teachers to fill in the gap in the learners' existing knowledge and skills necessary to efficiently complete their academic tasks and achieve their corresponding learning goals and objectives.

Generally, the findings presented a large extent of physical readiness among the respondents regarding technological tools, digital literacy, and independent learning capability, which interestingly contradicted the item referring to learners' acquaintance with the importance of online collaborative learning (OCL). Hence, the results revealed that self-directed and collaborative learning are beneficial as a set of skills required for online learning [13], and the importance of being technologically equipped and digitally literate for a successful online learning experience immensely helped.

Extent of Limitations

Table 4 shows the extent of limitations of learners while in remote physics teaching.

The mean scores indicate that, during emergency remote learning, students experienced limitations, including but not limited to physical ailments, difficulty managing time, inadequate finances for prepaid load services, a lack of comprehensive learning resources, an unstable internet connection, technical glitches, difficulty communicating with teachers and fellow students, an unfavorable learning environment, and difficulty understanding lesson and activity instructions. However, despite the limitations presented, it was notable that the respondents specified a small extent regarding their access to online learning gadgets such as smartphones and laptops. The said finding may imply that in terms of physical readiness, specifically technical preparations, the respondents were able to acquire the corresponding learning tools needed for their online classes. This finding is consistent with the presented extent of the learners' physical readiness.

The item *I experience technical glitches while accessing my learning materials, activities, and assessments (e.g., quizzes, exams, and performance tasks)*, with the highest mean score ($\bar{x} = 3.31$), can significantly represent technical glitches. This particular result is in line with the study of [19], who affirmed that such difficulties, including unreliable internet connectivity, were associated with lower student engagement, as they interfere with learning and participation. In that study, respondents who were unsure of their computer skills and faced technical difficulties had lower engagement scores than those with higher computer self-efficacy who faced a similar situation.

Aside from the aforementioned experienced limitations of the respondents, one of the notable instances was that teachers' instructions were vague in every learning activity (e.g., assignments, lesson activities, performance tasks, quizzes, quarterly examinations) ($\bar{x} = 3.09$), indicating a relatively moderate impact on student engagement. Students could manifest the said difficulty with the item *I submitted my requirements without understanding the corresponding content*. Limitations arising from the content format, lack of comprehensiveness, and problems with teachers' ability to employ technology in online learning could be affiliated with learners' difficulty understanding the provided course material. To comprehend the content of online reading materials, students may need help because teachers may present the instructional content as an e-book, PowerPoint, or video teaching material. Some teachers can use computers, but their abilities to help teach still need to be improved since some cannot connect to the internet network, use various learning programs, or create media or video lessons [20].

Another limitation indicated by the respondents was *I have difficulty communicating with my classmates during group activities or performance tasks,* and *I have difficulty communicating with my classmates during group activities or performance tasks* which interestingly contradicted an item under the learners' extent of physical readiness, *I have someone to ask if I don't understand our lesson*. Engagement and strategies are essential in an online learning environment [21]. In the study, students rated group work as the least valuable strategy. The said rating may explain why some

students rated this item low, which conveys that some students do not enjoy collaborating with peers. Thus, there is a need to improve how collaborative learning strategies in the teaching and learning process are used to provide valuable and equal opportunities to involve all learners throughout the instruction. When students primarily experience learning through teacher-centered instruction, they have fewer opportunities to relate their learning to themselves and to align that learning with their self-perceptions. The modality can impede them from continuing to learn and being engaged in the teaching and learning process [22]. As such, collaborative learning can be a great strategy to use.

Filipino students often experience many difficulties due to their sudden transition to remote learning. Those difficulties experienced by the students include unstable internet connectivity, insufficient learning resources, power outages, ambiguous learning contents, overburdened lesson activities, limited teacher scaffolds, poor peer communication, conflict with home responsibilities, poor learning environment, and financial issues [2]. These limitations affect students' cognitive engagement, particularly their sense of belonging. Socializing with classmates outside of the classroom boosts a sense of belonging, and program persistence is linked to peer group interactions, student-faculty contact, self-efficacy, and overall achievement [10]. Previous research findings identified social support from teachers, parents, and peers as a critical component that positively influences learners' involvement [23]. Learner-to-learner and teacher-to-learner social interaction significantly contribute to student engagement in an online learning environment [16].

Extent of Experienced Practicalities

Table 5 displays the extent of experienced practicalities of the students during remote Physics teaching.

Very small to significant qualitative ratings were observed for the experienced practicalities during remote physics teaching. The overall mean score of the learners' experienced practicalities ($\bar{x} = 3.025$) illustrates that the learners essentially experienced practicalities while learning physics in the enhanced multi-modality mode of learning. The finding implies that students were doing their best to adapt to the new learning mode and were resourceful enough to learn despite the hurdles presented by the improved multi-modality learning mode.

The study can also ascertain that the experienced practicalities of the students were relative to power interruption, internet connection, and the lesson itself. Before the *scheduled power interruption, students would charge their gadgets so they could still join in their synchronous classes*. The finding implies that the learners were responsible enough to know the scheduled power interruption and think beforehand. Also, students have a *large* extent of *utilizing data services as an alternative for Wi-Fi connection during power interruptions*. Accordingly, this shows how eager the students were to participate in class and to be creative in developing problem-solving techniques and coping strategies in their online courses [24].

Moreover, students have categorized mainly the extent to which they browse different educational websites, maximizing them as additional learning materials to understand their physics lessons better. Instructional, educational videos provide students with various benefits [25]. The effectiveness of video tutorials may be associated with online video being the most popular technology and social media application among the numerous technologies and social media applications used [26]. Students also asked more knowledgeable others (teachers, classmates, and others) if they needed help understanding their lessons and activities aside from browsing the internet, which positively impacted students. Exposure to collaborative- learning activities was also linked to improved critical thinking [27]. Learning with a group or collaborative learning is superior to solving and mastering more complicated mathematics problems [28]. Student resourcefulness and practicalities in finding solutions to learning issues and developing coping mechanisms help address `learning demands and environmental and personal issues [29].

Table 4. The extent of experienced limitations during emergency multimodal remote Physics teaching.

Items	*Mean*	*SD*	*QI*
1. I experience technical glitches while accessing my learning materials, activities, and assessments (e.g., quizzes, exams, performance tasks).	3.31	0.871	Moderate
2. The instructions of my teachers are vague in every learning activity (e.g., assignments, lesson activities, performance tasks, quizzes, quarterly examinations).	3.09	0.814	Moderate
3. I need help understanding my lessons.	3.13	0.904	Moderate
4. I need adequate learning resources.	2.87	0.837	Moderate
5. I submit my requirements without understanding the corresponding content.	2.95	0.928	Moderate
6. I do not have a conducive learning environment due to different distractions at home.	2.99	0.887	Moderate
7. I need someone to guide and help me with my lessons.	2.92	0.942	Moderate
8. I need more learning tools such as a laptop and smartphone.	1.82	0.973	Small
9. I need a stable internet connection.	3.08	1.275	Moderate
10. I cannot contact my teachers if I have emerging issues or concerns regarding the lesson or an assigned activity.	3.13	0.759	Moderate
11. I have difficulty communicating with my classmates during group activities or performance tasks.	2.92	0.788	Moderate
12. I need help managing my time with home responsibilities and learning activities.	3.22	0.898	Moderate
13. I need help with my finances for the internet load.	2.83	0.760	Moderate
14. I suffer from physical ailments because of the stress brought by remote learning.	3.03	0.916	Moderate

Overall Experienced Limitations	2.91	0.604	Moderate

Findings also revealed that students appear not to neglect their health and social life since the number of students who do not skip meals is significant, and a small number of students exercise before starting the lesson. Students also go out with their friends to release the stress of school requirements. Another practicality that students moderately experienced was making their learning schedule. A prepared learning schedule helped the learners manage their time and self-regulated learning.

Furthermore, most respondents have their gadgets or devices for learning, but some still borrow or go to computer shops for their learning. The said are evident with the experienced practicalities on Item #1 and Item #2 having a moderate extent. In an online environment, technical readiness is only helpful with the skills and attitude of the student, as well as the support of the institution, parents, and teachers [30].

The essence of online learning is the constant development of students' cognitive levels, and to learn effectively, students must actively participate in the learning process [31]. Moreover, since the qualitative extent of the students in their experienced practicalities is moderate, it conveyed that they participated effectively in class.

Generally, findings revealed that the students faced limitations in the multi-modality mode of learning physics, such as power interruption and a slow internet connection. However, the students were able to do some practicalities and strategies [15] to overcome the different challenges in the multi-modality mode of learning physics. Student attitude, a construct of emotional engagement [10], influences the effectiveness of e-learning [32]. Thus, the overall results suggest that the respondents were emotionally engaged with their learning despite the sudden shift to online learning. Optimistic and enthusiastic students will not experience e-learning as an obstacle to their academic success.

Level of Behavioral Engagement

Table 6 presents the level of behavioral engagement during remote Physics teaching.

The study categorized the overall behavioral engagement to a large extent. Mean scores on Items #3, #4, and #5 may clarify said categorization. Despite the transition to multimodal remote instructional delivery, the findings may suggest continued positive student learning attitude concretized by class attentiveness, being on task, and constant adherence to academic demands [33].

On the other hand, asynchronous learning allows students to feel more active and responsible for their learning progress, promoting a good learning environment [34]. In asynchronous delivery, students have complete control over their time and learning and can learn at their own pace. Using preferred teacher-developed instructional videos for asynchronous sessions positively impacts teaching and learning since they support flexible learning arrangements [35].

Students can access lecture videos anytime during the semester, allowing them to absorb the material completely by watching them at their most favorable time. They can freely repeat those parts with ambiguous or complex concepts for better topic understanding.

Supplementary to the asynchronous learning experience, 30-minute synchronous instruction provides students with a defined timetable and a sense of belonging since it allows educators to get a sense of the "whole-class" teaching experience and improve the quality of teacher-student communication. The synchronous meetings reinforce given and emerging learning challenges, providing students with instant feedback and allowing them to engage through live interaction and discussion regardless of their location, fostering flexible teaching-learning arrangements [35].

Table 5. The extent of experienced practicalities during emergency multimodal remote Physics teaching.

Items	***Mean***	***SD***	***QI***
1. I borrow devices (e.g., cell phone, laptop, desktop) from my other family members or relatives for learning online.	2.27	1.143	Small
2. I would go to the computer shop to do or submit activities online.	1.70	1.023	Very small
3. I would fully charge my gadgets before the scheduled day of power interruption so I can still participate in my online classes.	3.75	1.342	Large
4. I usually look for a place with a stable internet connection.	3.44	1.283	Large
5. I use data service as an alternative to Wi-Fi if there is a power interruption.	3.81	1.337	Large
6. I do my activities at dawn for a better internet connection.	2.93	1.117	Moderate
7. I meet with my classmates to conduct peer tutoring.	1.99	1.093	Small
8. I watch videos on YouTube to better understand my lessons.	3.32	0.917	Moderate
9. I browse various educational websites and use them as additional learning materials.	3.56	0.890	Large
10. I ask more knowledgeable others if I need help understanding our lessons and activities.	3.66	0.931	Large
11. I create a schedule for my learning and strictly follow it.	3.04	0.902	Moderate
12. I do some physical exercise before starting my lessons.	2.52	1.061	Small
13. I make sure not to skip meals for my health.	3.34	1.076	Moderate
14. I make time to go out and bond with my friends to release the stress of several lesson activities and projects.	3.02	1.132	Moderate
Overall Experienced Practicalities	3.02	0.481	Moderate

The acquired information relative to the respondents' behavior with their learning, despite the emergency remote learning set-up, featured their resilience and strong determination to achieve academic success. Learners adapted ways at their own expense to thrive despite their sudden transition to emergency remote learning [10]. Hence, the learners had an excellent capability to connect online without the pressure of face-to-face communication, as well as to observe how their peers formulated queries and responses in

online collaborative environments [13].

Level of Cognitive Engagement in terms of Self-efficacy

Table 7 illustrates that the learners were acquainted with their capabilities to accomplish their learning tasks and were confident of overcoming academic adversities, as indicated by the overall mean score of qualitatively described as significant. The results illustrate that most students believed they could complete their tasks correctly at their own expense [10] and overcome any difficult circumstances.

In a more profound sense, the learners gave a significant impression of having a moderate extent of awareness regarding their capabilities as students and individuals. It was indicated through their responses that they *could always manage to solve complex problems ($\bar{x}$ = 4.07), adjust to difficult situations ($\bar{x}$ = 4.11), determined to focus on their learning goals ($\bar{x}$ = 3.76), can remain calm despite adversities since they could rely on their coping skills ($\bar{x}$ = 3.67) and able to handle unprecedented circumstances effectively and efficiently ($\bar{x}$ = 3.48) due to their resourcefulness ($\bar{x}$ = 3.59).* Despite the sudden change to distance learning, the students could cope with the hurdles and unfavorable effects of the prevailing health emergency on the quality of their learning experience. To address concerns with the home learning environment, students talked to their families, moved to a quieter location, studied late at night when all family members were asleep, and sought advice from their classmates and teachers. Furthermore, students used the internet to overcome obstacles in learning resources by joining Facebook groups that shared free resources, seeking help from family members, using resources at home, and conferring with teachers [15].

Table 6. Level of behavioral engagement.

Items	*Mean*	*SD*	*QI*
1. I try hard to do well in this subject.	4.21	0.759	Large
2. I study my lessons well to understand the corresponding concepts.	4.08	0.784	Large
3. When I am in synchronous class sessions, I participate in-class activities.	3.82	0.922	Large
4. I pay attention during synchronous class sessions by clarifying complex terms or concepts about the lesson.	3.89	0.954	Large
5. I comply with my learning tasks because they are required.	3.96	1.033	Large
6. When in synchronous class sessions, I act like I am working.	2.86	1.210	Moderate
7. If I have trouble understanding a Physics problem, I go over it again until I understand it.	4.00	0.824	Large
8. When I run into a difficult homework problem in Physics, I keep working at it until I think I solved it.	4.00	0.903	Large
Overall Behavioral Engagement	3.85	0.128	Large

Level of Cognitive Engagement in terms of Self-efficacy

Table 7 illustrates that the learners were acquainted with their capabilities to accomplish their learning tasks and were confident to overcome academic adversities as indicated by the overall mean score of $\bar{x} = 3.79$, qualitatively described as large. The results illustrate that most students believed they could complete their tasks correctly at their own expense [10] and overcome any difficult circumstances. In a more profound sense, the learners gave a significant impression of having a moderate extent of awareness regarding their capabilities as students and individuals. It was indicated through their responses that they could *always manage to solve difficult problems* ($\bar{x}$ = 4.07), *adjust to difficult situations* ($\bar{x}$ = 4.11), *determined to focus on their learning goals* ($\bar{x}$ = 3.76), *can remain calm despite adversities since they could rely on their coping skills* ($\bar{x}$ = 3.67) and *able to handle unprecedented circumstances effectively and efficiently* ($\bar{x}$ = 3.48) *due to their resourcefulness* ($\bar{x}$ = 3.59). Despite the sudden change to distance learning, the students were able to cope with the hurdles and unfavorable effects of the prevailing health emergency on the quality of their learning experience. To mention, to address concerns with the home learning environment, students talked to their families, moved to a quieter location, and studied late at night when all family members were already asleep. and sought advice from their classmates and teachers. Furthermore, students used the internet to overcome obstacles in learning resources by joining Facebook groups that shared free resources, seeking help from family members, using resources at home, and conferring with teachers [15].

Table 7. Level of Cognitive Engagement in Terms of Self-Efficacy.

Items	*Mean*	*SD*	*QI*
1. I can always manage to solve complex problems if I try hard enough.	4.07	0.816	Large
2. If something goes against my way, I will try to adjust to the situation.	4.11	0.775	Large
3. It is easy for me to stick to my aims and accomplish my goals.	3.76	0.865	Large
4. I am confident that I can deal efficiently with unexpected events.	3.48	0.892	Large
5. I know how to handle unforeseen situations thanks to my resourcefulness.	3.59	0.832	Large
6. I can solve most problems if I invest the necessary effort.	2.86	1.210	Moderate
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	3.67	0.980	Large
8. I find several solutions when confronted with a problem.	3.76	0.830	Large
9. I can handle whatever comes my way.	3.73	0.803	Large
Overall Cognitive Engagement (Self-efficacy)	3.79	5.416	Large

In addition, students with a large extent of self-efficacy are more likely to put in extra effort, regard complexity as a challenge, and diversify their learning options than students with low self-efficacy, according to self-efficacy experts (Ketelhut, 2007). This research finding is evident with items

like, *I can solve most problems if I invest the necessary effort ($\bar{x}$ = 3.96), and I find several solutions when confronted with a problem. ($\bar{x}$ = 3.76), Moreover, I can usually handle whatever comes my way ($\bar{x}$ = 3.73)*. Accordingly, students with a higher level of self-efficacy would obtain more scientific data from more sources, and their scientific behaviors would improve faster over time [36].

Self-efficacy beliefs, which influence various behavioral and psychological processes, may suggest that they influence academic success. Students who firmly believe they can succeed in science tasks and activities are likelier to choose them, work hard to accomplish them, persevere in the face of adversity, and be guided by physiological indicators that boost confidence when encountering challenges [37].

Level of Cognitive Engagement in terms of Sense of Belonging

Table 8 presents a large extent of student cognitive engagement regarding a sense of belonging with a mean score of $\bar{x}$ = 3.92. However, the highest mean score indicated under the item contradicted the notion of personal space when studying. The finding revealed that the learners preferred studying alone because of its advantages. Some benefits of studying alone include reduced distraction, the ability to pace oneself, and improved attention. Distractions are limited because students have no other engagement than their academics when they are alone. They can also take breaks if they feel overwhelmed and even read at their own pace. Finally, the attention development that comes with studying alone is critical. Attention development allows students to learn areas they need to improve while reducing the focus on aspects learners already know. However, one disadvantage of studying alone is that learners do not have their peers or friends to encourage them to continue studying if they get off track. Even the most diligent students can become distracted for hours without recognizing it. That support system will enable learners to push themselves to get the most out of their study time [38]. Nevertheless, the other responses suggest that the learners felt belongingness with their peers while in a distance mode of learning, as illustrated by the item, *I am a member of my class* ($\bar{x}$ = 4.16).

The results further illustrate that despite the absence of in-person interactions with their peers and teachers, the respondents still managed to foster a great sense of belonging. The learners experienced a supportive learning environment and were comfortable participating in academic discourse while in synchronous physics class. In a specific instance, there was a very extent of agreement among respondents about having an inclusive and conducive online learning environment based on their favorable perception while in an online learning environment. Based on their responses, they were accustomed to showing their authentic character while joining their synchronous Physics class ($\bar{x}$ = 3.78), they felt comfortable asking questions during synchronous class ($\bar{x}$ = 3.47) and were comfortable conferring with their physics teacher ($\bar{x}$ = 3.73). They also gained respect from their peers ($\bar{x}$ = 4.17) and were acquainted with academic discourse ($\bar{x}$ = 3.74), as well as interacting with friendly classmates ($\bar{x}$ = 4.03). Additionally, the respondents felt a connection with their teacher ($\bar{x}$ = 4.20) and were comfortable asking for assistance from their more knowledgeable classmates or peers ($\bar{x}$ = 4.13). Through further analysis of the findings, the students' apparent level of sense of belonging signified a great impact on their learning experience specifically on how they acted and felt during their synchronous physics class. A correlation is evident in previous studies claiming that there is a substantial link between having a sense of community with interaction and the success of online learning. A good online learning community fosters a sense of belonging among students, allowing them to share essential information, establish common learning objectives, get to know one another, and build trust. Consequently, the amount of engagement in online courses is a predictor of perceived learning [35].

Table 8. Level of Cognitive Engagement in Terms of Sense of Belonging.

Items	*Mean*	*SD*	*QI*
1. I can be my authentic self during synchronous class sessions.	3.78	0.924	Large
2. I am a member of my class.	4.16	0.904	Large
3. I would feel comfortable asking my physics teacher for help if I need help understanding course-related material.	3.73	0.927	Large
4. My classmates treat me with respect.	4.17	0.645	Large
5. I feel comfortable contributing to discussions during our synchronous class sessions.	3.74	0.870	Large
6. Students in this class are friendly to me	4.03	0.769	Large
7. When I interact with the teacher in this subject, I feel he or she cares about how I am doing.	4.20	0.768	Very large
8. I would find it easy to join virtual study groups with my classmates if I wanted to.	3.66	0.866	Large
9. I give importance to my personal space when it comes to studying.	4.22	0.668	Very large
10. Most of us in the class have diverse values and attitudes.	4.03	0.919	Large
11. I have a lot in common with my classmates.	3.70	0.799	Large
12. I could call or message my classmates if I had a question about an assignment.	4.13	0.825	Large
13. I feel comfortable asking a question during synchronous class sessions.	3.47	1.042	Large
Overall Cognitive Engagement (Sense of Belonging)	3.92	5.767	Large

Meanwhile, the results also indicate that the learners strongly agree with the item *most of us in the class have diverse values and attitudes*, yet opposing the *item I have a lot in common with my classmates.* Such contradiction could signify that students have varying levels of motivation, perspectives on teaching and learning, and reactions to varied classroom environments and instructional approaches [39].

The corresponding level of students' cognitive engagement showed that the respondents were immersed in the learning process and strove to go above and beyond the minimum

standards [17]. Students may exhibit such learning behavior because online environments are less controlled than face-to-face classes, giving them more autonomy and encouraging cognitive engagement in selecting their learning resources. It also allowed students to use their preferred learning strategies to complete learning objectives in a way that suits them [13].

Level of Emotional Engagement in terms of Student Anxiety

From Table 9, the overall mean of student anxiety under emotional engagement is $\bar{x}$ =3.71, which has a qualitative interpretation to a large extent. The finding implies an above-average student anxiety with multimodal remote Physics teaching.

The rapid shift from face-to-face or in-person to e-learning caused many secondary students to experience anxiety and despair because of the increased workload [40]. Factors such as parents' educational level, issues with online learning [41], gender, and age [42], among others, affect the prevalence of students' anxiety. Female students and older students tend to have higher levels of depression and anxiety than male students and younger students.

Anxiety is a common human emotion characterized by fear and apprehension. An incident typically triggers it when a person's self-esteem is threatened [43]. Anxiety is a subjective experience of trepidation, tension, nervousness, and worry related to the nervous system's activation [44]. Experienced anxiety is evident in the items *this subject scares me* ($\bar{x}$ = 3.18), and *this subject makes me nervous* ($\bar{x}$ = 3.38), which students moderately experienced. The students experienced another form of anxiety, which was stress; as evident in the item, *this subject is stressful*, which was primarily experienced by the students.

Table 9. Level of Emotional Engagement in Terms of Student Anxiety.

Items	*Mean*	*SD*	*QI*
1. This subject is fascinating.	4.07	0.767	Large
2. I like this subject.	3.85	0.868	Large
3. This subject scares me.	3.18	0.922	Moderate
4. This subject is helpful for my future career.	4.08	0.678	Large
5. I need help understanding the concepts of this subject.	3.60	0.865	Large
6. I am interested in this subject.	3.89	0.823	Large
7. This subject is connected to my field of study.	3.90	0.807	Large
8. This subject is stressful.	3.43	1. 031	Large
9. This subject makes me nervous.	3.38	0.988	Moderate
10. I use this subject in my daily life.	3.62	0.851	Large
11. The skills I have acquired in this subject will be helpful to me in the future.	4.02	0.776	Large
12. This subject is helpful in every professional.	3.76	0.980	Large
13. This subject makes me love learning.	3.60	0.887	Large
14. This subject is complex.	3.60	0.981	Large
15. This is a complex subject.	3.73	0.884	Large
Overall Emotional Engagement (Student Anxiety)	3.71	7.697	Large

Anxiety affects students' behavior, cognition, and physiology, has an impact on students' academic performance [45], and is a prevalent problem during student examinations [46]. Anxiety-affected students have a subdued demeanor. Lack of enthusiasm in learning and poor exam and assignment performance are just a few of the effects of anxiety [44]. Indeed, anxiety harms the quality of life, education, and clinical practice of students [47].

It can also be learned that despite being stressed, nervous, and scared, students still believed that Physics is helpful in their future careers, as seen in item number 4, *this subject is helpful for my future career*, which has the highest mean $\bar{x}$ = 4.08 and described to a large extent. Students also found physics to be an exciting subject, but simultaneously, it is complex and challenging. Nevertheless, item number 13, *this subject makes me love learning* ($\bar{x}$ = 3.60), was primarily experienced by the students.

The findings seemingly suggest that given the large extent of student anxiety, teachers and parents should create a friendly and harmonized classroom and home environment to help the learners overcome their anxiety. Mental health experts say that anxiety and depression constitute significant issues that might lead to emotional and intellectual problems [48].

Furthermore, educators must strengthen student and teacher relationships to deliver quality education. Without genuine relationships and consistent instructor support, students acquire various forms of academic anxiety, which leads to academic difficulty. Consequently, it is critical to provide adequate support to the students [49].

Table 10. Level of Emotional Engagement in Terms of Student Attitude.

Items	*Mean*	*SD*	*QI*
1. I am looking forward to this subject every day.	3.52	0.870	Large
2. I think about the applications of Physics that I experience in everyday life.	3.63	0.850	Large
3. After I study a topic in this subject and feel that I understand it, I have difficulty applying that information to answer questions on the same topic.	3.71	0.921	Large
4. When I am answering a Physics question, I find it challenging to put what I know into my own words.	3.70	0.944	Large
5. I want to study Physics because I want to contribute to society.	3.62	0.938	Large
6. If I do not remember a particular approach needed for a question on an exam, there is little I can do (legally!) to come up with it.	3.18	0.973	Moderate
7. I enjoy figuring out answers to Physics questions.	3.73	0.815	Moderate
8. If I get stuck on a Physics question, there is no chance I'll figure it out alone.	3.23	1. 026	Moderate
9. There is usually only one correct approach to solving a Physics problem.	3.00	1.132	Moderate

10. Learning Physics that is not directly relevant to or applicable to human health is not worth my time.	2.57	1.121	Small
11. I enjoy explaining Physics ideas that I learn about to my friends.	3.63	0.976	Large
Overall Emotional Engagement (Student Attitude)	3.21	4.639	Moderate

Level of Emotional Engagement in terms of Student Attitude

Table 10 reveals a small to large extent of students' emotional engagement in learning attitudes in the multi-modality mode of learning physics. The overall mean of students' attitude toward physics is $\bar{x}$ = 3.21, which has a qualitative interpretation of moderate extent.

Students with a more positive attitude toward learning could do better in school [50]. Student attitudes and digital literacy could boost self-efficacy [51]. Hence, it is essential to foster more positive student attitudes, and educators should assess their curriculum and seriously consider creating user-friendliness in LMS design and delivering audiovisual assets. Item number 7, *I enjoy figuring out answers to physics questions* ($\bar{x}$ = 3.73) and item 1, *I am looking forward to this subject every day* ($\bar{x}$ = 3.52), proved that students have a positive attitude toward physics given that they enjoy and look forward to physics. However, there is a large extent that *after I study a topic in this subject and feel that I understand it, I have difficulty applying that information to answer questions on the same topic* ($\bar{x}$ = 3.71) and *when I am answering a physics question, I find it difficult to put what I know into my own words* ($\bar{x}$ = 3.70). The findings indicate that even if the students were interested and enjoyed learning physics, they had difficulty applying what they had learned. Furthermore, the items *if I do not remember a particular approach needed for a question on an exam, there is little I can do (legally!) to come up with it* ($\bar{x}$ = 3.18) and *if I get stuck on a Physics question, there is no chance I'll figure it out alone* ($\bar{x}$ = 3.23) have a qualitative description of moderate extent which could imply that students need more knowledgeable others to help them in their lessons and activities.

Previous research identified low computer skills, technological anxiety, computer hardware problems, poor study skills, low motivation, and an inability to work independently as factors contributing to students' negative attitudes toward online learning [52-53]. Overall, the findings suggest improved learner support to create a more positive attitude toward physics learning and, generally, for the students to learn and perform better.

4.0 CONCLUSION AND RECOMMENDATION

The unprecedented health crisis caused the sudden pivot of schools to panic pedagogies (i.e., Panicgogy).

Despite the sudden adoption of multimodal remote Physics teaching, students' level of physical readiness was above average, being well-prepared, literate, at ease using online learning software and technologies, and consistently positive towards learning. However, despite the said level of physical readiness, the extent of limitations experienced by the students is still reasonable – from unstable internet connectivity, insufficient learning resources, power outages, poor learning environment, and financial issues, among others. Nonetheless, students are very adaptive and employ several practical actions or alternatives to address given and emerging limitations or challenges.

Students' behavioral, emotional, and cognitive engagement vary from high to very high. The abrupt transition of students to a virtual learning set-up caused no significant shift in student engagement level from the pre-pandemic period and during multimodal remote learning.

Panicgogy is about understanding students' practicalities of physical readiness and, or limitations. Despite the reasonable physical readiness, practicalities, and engagement levels, educators need to continuously support the learners, especially with the given and possibly emerging limitations or challenges. As educators, we must be flexible enough to cater to students' needs, work on our relationship skills, and let the students know that we care.

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