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Research Article

Learning privilege divide: A framework for interrogating personal privileges of STEM students' education during the pandemic

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Following Pease's recommendation of interrogating personal privileges to critically self-reflect one's position and situation relative to others, this study aimed to construct a preliminary framework to interrogate STEM students' learning privileges during the pandemic. Coined as the learning privilege divide, it is defined as a framework to systematically analyze the extent of privileges and disparities present among students in terms of accessibility and degree of experiencing of specific learning privileges. It is composed of eight (8) major categories of privilege (technological considerations, learning resources, overall well-being, home-school balance, school-based assistance, financial considerations, individual learning capabilities, and external learning support), four (4) within-category indicators (minimal, limited, moderate, high), and four (4) learning privilege descriptors (marginalized, socially disadvantaged, moderately privileged, & highly privileged).

Keywords: STEM education, learning privilege, learning experiences, COVID-19 pandemic

1. Introduction

Three years after the COVID-19 pandemic hit the whole world, consequently it was observed that the educational system is gradually reverting to its pre-pandemic traditions. While the shift is a good educator of improving learning conditions, it is imperative that the events of the past tumultuous years remain relevant in addressing students' learning experiences. More importantly, the pandemic school years highlighted the extent of privileges that some students have over others, an important factor that educators must critically assess the disparities that they had experienced or experiencing (Hogan, 2022a). In hindsight, privilege is defined as possessing *certain social advantages, benefits, or degrees of prestige and respect that an individual has by virtue of belonging to certain social identity groups* (Garcia, 2018). Without question, we live in a divided world where there are people who live in better living conditions as compared to others. According to Black and Stone (2005), privilege necessitates power dynamics emphasizing *any entitlement, sanction, power, and advantage or right granted to a person or group solely by birthright membership in a prescribed group/s*. As a form of social advantage, privilege proliferates the existence of a gap or divide amongst individuals from different walks of life.

We can look at privilege as having the luxury of not recognizing or acknowledging one's own advantage, as if we are living in our bubble (Hogan, 2022b). For the most part, students were focused on their personal circumstances, mental dilemmas, and accomplishing academic requirements. Each school day during pandemic, they tried their hardest to move one step closer to finishing school. Educational setting, as an institution, it reflects the broader society we live in which includes the patterns of privilege and marginalization that exists within it (Marx et al., 2017). Each student experienced a different set of academic privileges, defined as the factors within an educational environment that favor certain individuals, considering diverse personal and social

factors such as race, identity, economic disparities, resource access, social relationships, and social settings (Hogan, 2002a).

Within the two school years of online learning and a year of hybrid learning, students shared how their learning experiences were plagued with concerns pertaining to access to quality and stable internet connection, individual adjustments, mental health concerns, personal responsibilities, availability of conducive learning spaces in their households, uncontrollable outside noises, limited communication with peers and mentors/teachers, and shortcoming of school administrations (Barrot et al., 2021; Beruin, 2022; Funa & Talaue, 2021; Locion et al., 2022; Pinar, 2021). All of which highlighted the different realities that each student faced as they navigated or pulled through their day-to-day circumstances.

In exploring privilege, Kolan and TwoTrees (2014) emphasized its three important aspects. The first aspect is privilege as contextual. This indicates that as individuals, we navigate through different social environments, each with its own set of power dynamics and accessible advantages. Within these sub-systems, we may experience varying degrees of privilege based on various factors. Simply put, while someone may hold a certain level of privilege in one context, they may be marginalized or disadvantaged in another. Second, privileges are unearned. This means that there are individuals with access to a set of opportunities and advantages only because one was born with a specific identity that is outside of one's control (i.e., from a rich family, living in a highly urbanized area). Last, there exists a degree of privilege, wherein it is not a dichotomy between the haves and have nots but rather a spectrum. Even individuals who may face marginalization or oppression in certain aspects of their lives can still hold privilege in other areas and vice versa. Because we generally have a limited understanding of other people's realities, Macatangay (2020) explained that one's failure to recognize his/her privileges results in a narrow judgment and a lack of empathy for others' situation.

As emphasized by Pease (2022, p. 9), *privilege structures the world so that its mechanisms are either invisible or appear to be natural*, thus the need to uncover it in addressing the consequences. To do this, one of the approaches proposed was to interrogate one's personal privilege. By interrogating personal privileges, each person critically self-reflects the privileges that one holds based on their social identities and positions of power. It involves consciously examining and questioning the advantages, benefits, and opportunities one may have because of any privileges or other external factors. Applying this approach encourages individuals to go beyond surface-level recognition of privilege and delve deeper into exploring how their privilege shapes their perspectives, experiences, and interactions with others.

In doing so, the primary objective of this study is to construct a framework to interrogate students' learning privileges during the pandemic. Specifically, 1) by analyzing existing literature on STEM students' experiences and specific privileges that they had likely experienced to construct the framework, and 2) producing a checklist to categorically enumerate the manifestations of learning privilege divide. Given the researcher's specific focus, the study drew from existing literature that explored experiences, challenges, and privileges in STEM Senior High School [SHS] education.

2. Method

Using a review of secondary data from various related literatures, this article aims to construct a preliminary framework in analyzing and visualizing the learning privilege divide that exists among students. This article then proceeds to discuss the following: firstly, dimensions of learning privileges; secondly; framework of learning privilege divide; and lastly, concluding remarks. Variety of related research articles were screened to confirm its applicability in this study. In searching and screening relevant journal articles, Google Scholar database and ResearchGate were utilized, with the primary criteria of being published from 2021 to early 2023 and reflected through keywords: "STEM education", "pandemic", "distance learning, "remote education", "senior high school", and "Filipino students". Qualitative content analysis was utilized to identify patterns,

themes, and/or trends wherein, each literature was read and reread to generate data that linked and manifested as students' privileges.

According to Elo et al. (2014), the goal of content analysis is to reduce gathered data into concepts to empirically describe the phenomenon. To ensure trustworthiness in content analysis, a coding scheme was developed and well-saturated through an iterative process, ensuring that it captures the nuances and complexities of the rich textual data. The researcher manually coded relevant results in a spreadsheet and assigned broad codes which formed the foundation for the generated themes. Likewise, data reliability was observed since the researcher the sole data coder. Throughout the process, consistent application of the coding scheme was ensured by following set parameters: 1) what information constitutes as a learning privilege?; 2) does this information fall within any categories of privilege?; and 3) does this information generally adheres to all three aspects of privilege? Analysis was terminated once data saturation was reached. The next step was to assess relationships from the emerged themes. Two themes were observed to manifest across other eight (8) themes hence, were synthesized as indicators/descriptors of the framework. Furthermore, the conceptualization of the checklist, indicators, and descriptors were based on the researcher's in-depth consideration of providing a practical tool based on analyzed data, following Elsherif et al. (2022) approach.

3. Dimensions of Learning Privilege

After thorough analysis of relevant studies, a total of ten (10) prominent themes or categories emerged from the collected data. Among these themes, the first two (2) categories were identified as dichotomized properties that characterizes learning privilege and were observed consistently across all eight (8) other categories. These categories provided insights into the contextualized manifestation and experiencing of academic privilege. Specifically, these are as follows: 1) accessibility, 2) degree of experiencing, 3) technological considerations, 4) learning resources, 5) overall well-being, 6) home-school balance, 7) school-based assistance, 8) financial considerations, 9) individual learning capabilities, and 10) external learning support.

3.1. Accessibility

At the core of academic privilege is its accessibility to STEM students, that is present across all eight (8) emergent categories described in the succeeding paragraphs. However, learning privileges that manifested or experienced by STEM students vary from being accessible to inaccessible. Within the proposed framework, accessibility is operationalized as the extent of availability in experiencing specific learning privilege. Specifically, it focuses on the ease of access through external barriers or circumstances that affects a STEM student's ability to benefit from certain learning privileges (Beruin, 2022; Cano, 2022; Desabayla, 2022; Funa et al., 2021; Fietzie, 2022; Pinar, 2021; Rogayan et al., 2021; Vallespin & Prudente, 2022).

3.2. Degree of Experiencing

Similar to accessibility, degree of experiencing was evident across all eight (8) emergent categories discussed here. The degree of experiencing that STEM students had manifested or experienced is operationalized as the extent of change in their learning privileges, either increasing or decreasing. This meant that the learning privileges that STEM students had experienced varied in terms of how minimal, limited, or extensive their personal experience was, which is reflected primarily by its subjective aspect. Specifically, in the data corpus, it was observed in terms of acceptance, positive feedback, engagement, and a learning privilege being essential or required (Duran & Sumagang, 2022 ; Kim & Saldana, 2023; Locion et al., 2022; Pinar, 2021; Rogayan et al., 2021; Taunan et al., 2021).

3.3. Technological Considerations

As a learning privilege, technological consideration is operationalized as a set of learning privileges that STEM students have access to and experienced in terms of quality internet

connectivity, gadgets, and other necessary hardware for distance learning. Learning during the pandemic required internet connectivity. Nevertheless, poor and unreliable internet connection remained the most prominent concern among students (Duran & Sumagang, 2022; Nunez et al., 2022; Pinar, 2021). Access to reliable internet connectivity played a pivotal role in facilitating student participation and enhancing student productivity (Fietzie, 2022). Students with this privilege were more likely to benefit from immediate feedback through online academic consultations, actively engage in class, and submit their requirements on time, as noted by Cano (2022), plausibly resulting in positive academic performance. Accessibility to reliable internet access served as a crucial enabler, allowing students to enhance their overall educational experience.

Despite having access to internet connectivity, issues regarding its overall reliability have been observed among STEM students. Several studies have highlighted instances where students encountered challenges, specifically intermittent and slow connections disrupting their learning experiences (Ragpala, 2021; Vallespin & Prudente, 2022). In addition, fluctuating internet speed was revealed to be caused by network problems and even the number of users within their household (Beruin, 2022). For Alcazaren (2021) and Desabayla (2022), STEM students faced the challenge of poor internet connection, significantly impacting their ability to actively participate and contribute to class discussions.

For STEM students who lack access to internet connectivity at home, one available option is to seek out places that provide Wi-Fi connection (Desabayla, 2022; Fietzie, 2022). In many rural areas of the Philippines, where internet access may be limited, another approach is to utilize the modular learning approach (Duran & Sumagang, 2022). This alternative method involves the use of offline materials and resources that students can access and complete without relying on internet connectivity. These strategies provided potential solutions for students facing internet access challenges, allowing them to continue their education through alternative means. For Funa and Talaue (2021), the use of biology self-learning modules (BSLM) was viewed positively, wherein the content and activities provided in the modules were perceived relevant, comprehensive, and applicable to real-life situations. However, the interactive nature of online learning greatly helps STEM students during pandemic, particularly in science requirements (Gastar & Linaugo, 2022; Padios & Tobia, 2022).

Another concern that emerged is the access to quality gadgets and necessary hardware to accommodate distance learning during the pandemic. Students with smartphones can attend classes anytime and anywhere (Fietzie, 2022; Vallespin & Prudente, 2022) and easily consult with their teachers about their academic performances (Cano, 2022). In addition to owning a laptop or desktop, Diaz (2021) and Beruin (2022) emphasized the importance of these devices meeting certain specifications (i.e., necessary software, and decent peripherals like headphones with microphone and webcam) to effectively support distance learning. In some cases, students found themselves having to share a laptop or desktop with their siblings, who also need to attend their own online classes or finish an assignment (Beruin, 2022; Nunez et al., 2022)

3.4. Learning Resources

As a learning privilege, learning resources is operationalized as a set of learning privileges that students have access to and experienced in terms of quality learning management system (LMS), supplementary learning materials, laboratory requirement, and study area for distance learning. This specific category is intricately linked to technological considerations, as the first two sub-categories mentioned earlier rely heavily on technology. Several studies highlighted that access to learning management system (LMS) platforms is important for STEM students during this unique period of learning, particularly for Mathematics and Science (Bombaes et al., 2021; Gastar & Linaugo, 2022; Kim & Saldana, 2023) subjects. The extent of students' familiarity with the LMS influences their positive response towards this resource (Samson et al., 2023). For an individual to properly adapt to new technology, it is imperative that it is easy to use or navigate and generally useful for its intended purpose (Fietzie, 2022). Herman and Banister (2007) accentuated its

effectiveness in supporting the academic performance of students. E-Commons, a platform utilized by most public schools, was well-received as a quality, usable, and resource-efficient LMS among STEM students because it caters to their learning needs and to disadvantaged (Kim & Saldana, 2023). Similarly, MS Teams was a preferred platform for its ease-of-use and high usability (Ong et al., 2022). However, slow internet connectivity hindered their overall productivity. With the E-Commons, it was revealed as unoptimized in slow internet connection (Kim & Saldana, 2023). And in some cases, disadvantaged students with no access to these platforms received mediocre instructional materials to compensate for their learning (Cano, 2022).

In terms of supplementary learning materials, video tutorials, particularly YouTube, demonstrated its usefulness to STEM students (Aguila et al., 2022; Desabayla, 2022). Likewise, pre-recorded lectures were viewed positively by students, primarily due to its re-watchability and option to pause for better information retention at their convenience (Vallespin & Prudente, 2022). This made students perceive Chemistry as more entertaining and easier to learn (Apostol, 2023). The use of task cards as supplementary learning materials was also viewed as useful in providing focus and direction of self-directed science curriculum (Jardinico & Linaugo, 2023). According to Santiago and Soliven (2023), aside from Math and Sciences, STEM students had struggled with their Research subjects brought about by their lack of exposure to research-related materials. Thus, it was highly recommended that students were provided with access to abundant learning resources and exposed to research reviews, conferences, and similar undertakings (Santiago & Soliven, 2023; Vallespin & Prudente, 2022). Conversely, it was highlighted that there were students who sought academic assistance from tutorial websites as it contains diverse shared content and availability of academic experts (Aguila et al., 2022).

Part of STEM learning are courses with laboratory requirements such as Chemistry and Physics. Several studies revealed that laboratory activities were carried out online and obliging students to procure their own materials (Funa & Talaue, 2021; Pacifico & Prudente, 2021). In some cases, laboratory classes were implemented through home-grown experiments, guided by instruction materials and teacher facilitation to achieve intended results (Pacifico & Prudente, 2021). Virtual laboratory was also utilized, which was perceived by STEM students as useful in acquiring knowledge on STEM topics (Beruin, 2022; Padios & Tobia, 2022). Aguila et al. (2022) added that students' appreciation and engagement of said online tool can be further improved if modified to suit the students' capabilities. However, both options had its limitations, with the former emphasizing the unavailability of lab materials and lack of collaboration leading to loss of interest (Funa & Talaue, 2021) and the latter in terms of acquiring skills in a real laboratory setting (Pinar, 2021).

In terms of study area as a learning privilege, a conducive study area is operationalized as a separate area inside the house that is well-ventilated and has minimal to no distractions such as household chores, outside noises, & pollution (Beruin, 2022; Ragpala, 2021). Beruin (2022) emphasized the significance of having a dedicated study area separate from one's bedroom to create a clear separation between academic activities and resting. However, the reality for most STEM students is far from this ideal, as most of them viewed their home as a place that necessitates personal responsibilities and full of distraction to learning which includes their bed, smartphone, noise from animals and vehicles outside, chatters from neighbors or family members, and household chores to finish (Nunez et al., 2022; Ragpala, 2021). In some cases, the distractions or interfering noises came from the teacher's end (Pinar, 2021).

3.5. Overall Well-being

As a learning privilege, overall well-being is operationalized as a set of learning privileges that STEM students have access to and experienced in terms of support from family and/or friends, seeking professional help, and self-care. The abrupt changes in the educational landscape brought by the pandemic put a huge toll on their mental well-being. STEM students experienced some form of stress, anxiety, and even depression as they shifted their education to a different learning mode (Locion et al., 2022). Similarly, students were burdened with overwhelming academic

workload, lack of proper sleep, fatigue, and pressure from parents to continue studying/graduate on time (Duran & Sumagang, 2022; Pinar, 2021; Rogayan et al., 2021). It was also reported that 2022 saw a huge increase in student-related suicide and attempted suicide in the country (Ramos, 2023).

To alleviate these concerns, receiving emotional support from family and friends emerged as a crucial privilege during those trying times (Beruin, 2022; Duran & Sumagang, 2022; Taunan et al, 2021). Having someone to listen to one's fears and worries provides a profound sense of reassurance, reminding you that you are not alone in your struggles. As mental instability affected students' academic performance (Beruin, 2022; Taunan et al., 2021), staying at home allowed students to bond with their families. This in turn positively influenced their emotional well-being and improved their relationship with their family members. These sentiments emphasized the importance of receiving comfort, guidance, or any form of emotional support from family members to improve well-being and in turn, positive academic results (Duran & Sumagang, 2022; Rogayan et al., 2021). In some cases, being at home for a prolonged period allowed students to heal from the distress of being bullied in school (Nunez et al., 2022).

However, there were still instances of family members being busy or at work, hence leaving no one to interact with or guide STEM students with their lessons (Duran & Sumagang, 2022). Thus, interaction and moral support from peers were also significant to students' determination to learn (Desabayla, 2022; Taunan et al., 2021) and obtaining social knowledge (Cano, 2022). Classes that promoted learner interactions among students positively impact their well-social being (Afable et al., 2022). In the absence of parents, students are likely to seek academic help from friends or classmates (Silan, 2021). The lack thereof hindered maintaining constant academic motivation (Beboso & Bual, 2022). Despite the limitations of online communication, peer support was helpful for STEM students to navigate through their online classes (Beruin, 2022). Likewise, providing students with options to seek virtual or in-person counseling and psycho-social interventions, both within school or thru external providers, emerged as one of the means to address academic and emotional fatigue (Dumlao-Abadilla, 2022; Silan, 2021). However, Silan (2021) stated that it is equally important to emphasize raising awareness about normalizing students' willingness to seek professional help and providing easy access to mental health-related resources. Lastly, student's ability to practice self-care emerged as another option to maintain a better well-being and disposition. These coping strategies include time management, seeking a conducive study area, affording oneself of proper sleep, and leisure through online gaming with friends (Apostol, 2023; Beruin, 2022; Pinar, 2021).

3.6. Home-school Balance

As a learning privilege, home-school balance is operationalized as a set of learning privileges that STEM students have access to and experienced in terms of achieving balanced aspects of being a responsible student and responsible son/daughter. A consensus among relevant studies indicated that, for most of the three school years, students were unable to attain such learning privileges (Taunan et al., 2021; Vallespin & Prudente, 2022). The primary reason behind this phenomenon is rooted in the prevailing idea that education is primarily associated with learning within the school's confines rather than in the comfort (or lack thereof) of students' homes. Throughout the day, doing household chores became an inevitable part of their online classes or module work, which was often perceived by STEM students as a significant distraction for STEM students (Locion et al., 2022; Taunan et al., 2021). While the ideal scenario is to allow students to focus on studying for the duration of their school hours, Beruin (2022) revealed that there were students who were left at home to fend for themselves, some were the eldest ones, taking care of their younger siblings. In other cases, students even took up part-time work to alleviate the financial burden faced by their parents (Duran & Sumagang, 2022; Vallespin & Prudente, 2022).

3.7. School-based Assistance

As a learning privilege, within-school academic assistance is operationalized as a set of learning privileges that STEM students have access to and experienced in terms of adaptive teaching

strategies, communication with teachers, technical support, and scholarship programs. For most Filipino students, the traditional classroom follows a typical structure where teachers deliver their lecture in front of a class, foster interactions among students, facilitate questions/clarifications, and promote class engagement. All of these are generally achieved within the allotted class time. However, the disruption caused by the COVID-19 pandemic, temporarily replaced the traditional classroom with a virtual setup at home. STEM students observed how their teachers scrambled to adjust and try to teach effectively despite the abrupt changes in their teaching routine, especially in teaching Math, Sciences, and Research subjects (Beruin, 2022; Santiago & Soliven, 2023; Taunan et al., 2021). Without the presence and immediate guidance of teachers, students experienced difficulties understanding their lessons, with no other option but to self-study (Locion et al., 2022; Taunan et al., 2021). Increased academic workload across all subjects within a given week or period and insufficient time to accomplish tasks also emerged as another concern (Fietzie, 2022; Rogayan et al., 2021), of which was more problematic to students with special needs (Vallespin & Prudente, 2022). Similarly, the teaching strategies employed by teachers in the early months of the pandemic posed additional challenges to students, compounding on the already difficult STEM subjects, specifically requiring the use of an educational platform (Duran & Sumagang, 2022; Locion et al., 2022).

Whereas most theories in formal education focalized the teacher-learner interaction in fostering quality learning, Bower (2017) explained that the pandemic necessitated teachers and school administrations to redesign their STEM curriculum with self-directed learning in mind. The asynchronous mode of delivery enabled a flexible curriculum design for students to access and learn lesson materials at their own convenience (Pinar, 2021). Data revealed that in the latter school years, STEM students perceived improvement in the overall pedagogical methods applied by their teachers. Existing literatures revealed that such privileges were evident in terms of competent use of online resources and collaboration tools, recalibrating lessons to most essential competencies required for STEM graduates, applying gamification in lessons and assessments (i.e., Kahoot, Quizizz), enriched and relevant learning modules, reasonable due dates, doable workplans, and reducing workload to course requirements aligned to STEM learning (Funa et al., 2021; Sumandal, 2023; Vallespin & Prudente, 2022). Providing creative and innovative practical exercises and enthusiastic teaching in Chemistry and other Science subjects was an important recommendation for STEM teachers (Mecida et al., 2023). Correspondingly, Funa and Talaue (2021) underscored how the teachers aided in alleviating the digital divide by providing alternative options, accommodating specific student needs, and any support that they can offer to students who were adversely affected by the pandemic.

Another major issue that emerged was communication with their teachers regardless of students' respective distance learning modality. Primarily through video conferencing, Pinar (2021) revealed that communication with teachers positively affects students' feeling of engagement and motivation in learning the subject. Teachers must provide timely and accurate feedback to improve teacher-student relationship and STEM learning however, the inadequacy of it was evident throughout the pandemic (Taunan et al., 2021; Vallespin & Prudente, 2022). The lack of feedback even affected students' academic motivation (Beboso & Bual, 2022). Teachers, much like the students, also faced digital inequalities that hampered their ability to extend their assistance and accommodate students' specific needs. Amidst those challenging times, as stated by Fietzie (2022), teacher's assistance became significant more than ever.

In terms of online learning modality, concern over the lack of technical support was prevalent (Beruin, 2022; Rogayan et al., 2021; Vallespin & Prudente, 2022). Given that teachers were the designated frontliners of their schools, they were considered as the point persons to resolve any technical issues students encountered with their digital tools or platform. Yet, as teachers were on the same learning curve as their students, acquainted with these tools on the fly, they were mostly ill-equipped to address such issues. As recommended by Vallespin and Prudente (2022), establishing a technical support unit, composed of qualified professionals, will greatly help students in this regard.

Lastly, the scholarship program, which is related to the category 'Financial considerations', draws attention to the role of educational institutions in promoting equal access to education to students in need. This can be achieved by providing scholarship opportunities or financial assistance to deserving STEM students and attracting learners to pursue STEM education (Desabayla, 2022; Rogayan et al., 2021).

3.8. Final Consideration

As a learning privilege, financial considerations is operationalized as a set of learning privileges that STEM students have access to and experienced in terms of financial capacity or struggle. World Bank (Fallesen, 2021) reported that the pandemic has significantly impacted the socioeconomic conditions of most Filipino families, leading to a range of challenges, such as loss of income and job loss, which have greatly affected their livelihoods. As families faced financial hardship, some students were forced to drop out of school to support their families, transfer to public schools, or limit education-related spending to prioritize basic needs. A person's financial capacity remains a critical factor in achieving academic success (Dang 2015). This indicates that, during the pandemic, living without any financial struggles ensures better learning privileges. However, results revealed that STEM students experienced some form of financial concerns in the past two years (Desabayla, 2022; Duran & Sumagang, 2022; Rogayan et al., 2021). In public schools, parents voiced their financial woes to purchase mobile loads so that their children can attend virtual classes and submit online requirements (Diaz, 2021). Because for most families, they lack the privilege to afford mobile data load, let alone subscribing to a home Wi-Fi plan, hindering their ability to meet the requirements for distance learning (Taunan et al., 2021). Hence, as previously mentioned, scholarship programs have been recognized as invaluable financial assistance for students who are in need.

3.9. Individual Learning Capabilities

As a learning privilege, individual learning capabilities is operationalized as a set of learning privileges that STEM students have access to and experienced in terms of dealing with STEM subjects and self-studying. As reported by UNESCO (Sison & Devraj, 2022), even before the pandemic, STEM education faced challenges, as the country ranked poorly in several learning metric surveys. Fast forward today, the country remains laggard in improving the state of science and technology, mathematics, and engineering in the country. The transition to online learning during the pandemic proved challenging for STEM students, who expressed difficulties in learning (Alcazaren, 2021; Rogayan et al., 2021; Santiago & Soliven, 2023). Subjects like Chemistry, Physics, and Research were viewed as ill-suited for online or modular teaching methods, further exacerbating the situation. However, STEM students with access to video lectures, LMS, virtual laboratory, and interactive games reportedly experienced a more positive STEM learning (Kim & Saldana, 2023; Mecida et al., 2023; Pinar, 2021), indicating how the availability of numerous learning resources entailed a better learning experience of STEM subjects.

For STEM students, education during the pandemic was generally characterized by self-studying or independent learning (Beruin, 2022; Locion et al., 2022; Pinar, 2021). Increased demand for self-directed learning during this period was also reported (Vallespin & Prudente, 2022). This was heavily in part due to its online nature, allowing students to utilize the internet for learning and the ease of reviewing recorded lecture materials, typically in video formats. While the early school days of the pandemic saw students working on tasks individually given their circumstances (Alcazaren, 2021), as they adapted to their specific learning modalities, their confidence in learning STEM subjects grew and were able to have better remote collaboration within groups (Ragpala, 2021). Here, effective time management played a pivotal role in their learning, specifically by aligning their priorities, submitting tasks on or before deadlines, and devoting the required time to accomplish their requirements.

3.10. External Learning Support

As a learning privilege, external learning support is operationalized as a set of learning privileges that STEM students have access to and experienced in terms of peer mentoring, parent monitoring, and academic tutoring. As discussed earlier, peer support played a significant role in improving students' well-being. Such support extended towards academic motivation, during the pandemic, through online study sessions typically via Facebook or Discord (Aguila et al., 2022; Beruin, 2022; Desabayla, 2022). Facilitating learner-to-learner interactions promoted a venue for social engagement, leading to increased motivation and collaborative construction of knowledge among learners (Afable et al., 2022; Cano, 2022). As shared by Beruin (2022), it was through virtual hangouts, even after school hours, that allowed them to push through with their studies. However, it is also crucial to emphasize that during the pandemic, reports revealed of committing academic dishonesty being positively associated with peer involvement (Beruin, 2022; Magsambol, 2021a; Perez, 2021; San Jose, 2022).

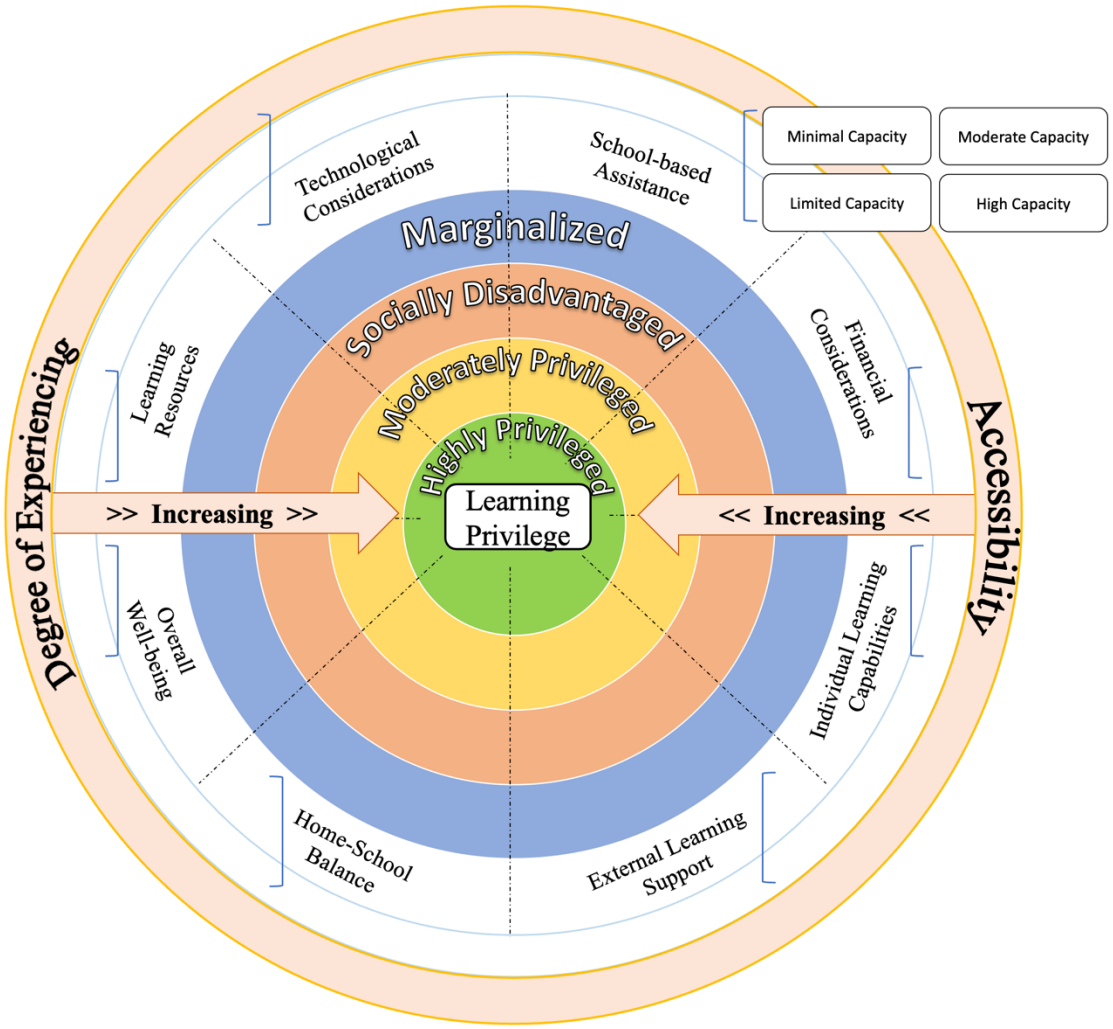
For some students, their parents were heavily involved in developing good study habits, getting good grades, and staying focused to improve academic performance (Cano, 2022; Quijano et al., 2023), playing the role of a teacher to their child. As shared by Duran (2022), the pandemic allowed one's parents to actively monitor their study routines which was challenging before. Quijano et al. (2023) added that while parental involvement is crucial, prioritizing a delicate balance between guidance and a student's freedom of choice and expression should remain paramount. However, some students had parents who lacked the knowledge or ability to provide academic assistance for them (Beboso & Bual, 2022). More importantly, there were reports of students availing after-school tutoring to assist in their Math or Physics subjects (Beruin, 2022; Cano, 2022) and academic servicing, wherein they pay others to answer or complete a specific academic requirement (Aguilar, 2021; Magsambol, 2021b).

4. Framework of Learning Privilege Divide

To challenge the prevailing norm, one of Pease's (2022) recommendations was to acknowledge and recognize one's set of privileges as means to confront the existing divide within the society. To achieve this, the first step to take is understanding the extent of an individual's manifesting and/or experiencing of a learning privilege/s. For this framework, the researcher coined the *learning privilege divide*, conceptualized as a framework to systematically analyze the extent of privileges and disparities present among students in terms of access and degree of experiencing of their specific learning privileges. Building upon Hogan's (2022b) definition, the concept of 'learning privilege' was adapted from academic privilege. Changing the word 'academic' to 'learning' was intended to align the concept with the pattern as evidenced by the collected data.

Following Elsherif and colleagues' (2022) study, Figure 1 illustrates the learning privilege divide, modeled to a wheel composed of an outer ring, middle ring, and inner rings. The outer ring, composed of accessibility and degree of experiencing categories, encompasses the other eight (8) major categories found in the middle ring: technological considerations, learning resources, overall well-being, home-school balance, school-based assistance, financial considerations, individual learning capabilities, and external learning support. Within each category in the middle ring are four (4) within-category indicators (presented in brackets). Situated in the inner rings are four (4) learning privilege descriptors that applies to every category directly above it. Consequently, the inner rings are closely linked to the outer and middle ring because as accessibility and degree of experiencing were observed more (increase) in each major category, the higher a student's learning privileges are.

Figure 1
Learning Privilege Divide Framework



The results discussed on each major category in the preceding section constitute the items of the learning privilege checklist (see Table 1), wherein each component receives one (1) point. The higher the score, the more privilege a STEM student was during the pandemic, with seventy-five (75) points as the maximum score for the learning privilege descriptors while maximum score varies for the within-category indicators. Correspondingly, each of the learning privilege descriptors, described in the next paragraph, is associated with a point range system.

Table 1
Learning privilege checklist

Technological Considerations
Internet connectivity
1. I have stable and reliable (in terms of speed) internet access at home
2. I have internet access at home, but it is slow or intermittent
3. I have internet access through mobile data or prepaid Wi-Fi
4. I have internet access through public Wi-Fi
Learning modality
5. Modular learning was the only approach utilized in my classes
6. Modular learning was the primary option, but we sometimes have online class or submit activities online
7. Online learning was utilized in my classes, but felt lacking in quality online tools
8. Online learning was utilized in my classes, with plenty of quality online tools available

Table 1 continued

- Devices and necessary hardware
  9. I have used a gadget or device (i.e., smartphone, tablet, laptop, or desktop) but it has outdated hardware
  10. I have used a gadget or device, but I shared it with a family member/s
  11. I have used a gadget or device that met the specifications required for online learning
  12. I have used supplementary hardware or equipment i.e., headset w/ microphone, HD webcam, or external microphone.
- Learning Resources
  - Learning management system (LMS)
    13. I have used an established Learning Management Systems in my class i.e., Canvas, Blackboard, Google Classroom, or Moodle.
    14. I have utilized a quality LMS in terms of ease-of-use, high usability/functionality, resource efficiency, and optimized to devices used.
    15. I have used Facebook for online learning
    16. I have used other social media sites (i.e., Discord) as alternatives for online learning.
  - Supplementary learning materials
    17. I have received printed supplementary learning materials to aid in my STEM learning.
    18. I have received web-based learning materials in the form of YouTube tutorials
    19. I have received web-based learning materials in the form of pre-recorded or recorded lecture tutorials.
    20. I have received access to knowledge repositories or databases.
    21. I have access to tutorial assistance or academic servicing websites.
  - Laboratory requirement
    22. I have conducted home-grown experiments at home to learn about science concepts.
    23. I have used a virtual laboratory to simulate Science experiments.
    24. I have used experiment video tutorials to learn about science concepts.
    25. I have participated in engaging laboratory activities despite the limitations of online learning.
  - Study area
    26. I have a study area that I share with my siblings in our house
    27. I have a personal study area separate from my room
    28. I have a personal study area that is well-lighted and well-ventilated throughout the school year
    29. I have a personal study area that has minimal to no external distractions from other family members, neighbors, or outside noises throughout the school year.
- Overall Well-being
  - Support from friends and/or Family
    30. I have received academic support from my friends
    31. I have received emotional support and comfort from my friends
    32. I have received academic support from my parents or other family members
    33. I have received emotional support and guidance from my parents or other family members
  - Seek professional help
    34. I have received virtual counseling session/s or psycho-social intervention from my school.
    35. I have received in-person counseling session/s or psycho-social intervention from my school.
    36. I have received virtual or in-person counseling or intervention from Local Government-initiated program
    37. I have sought virtual/in-person counseling or intervention from a mental health professional.
  - Self-care
    38. I have practiced effective time management.
    39. I have sought a conducive study area for learning
    40. I have provided myself with proper sleep.
    41. I have afforded myself some time for leisure, usually by watching movies, series, or playing online games with friends

Table 1 continued

- Home-School Balance
  - Achieving balance in terms of responsibility as a student and as son/daughter
    42. During class hours, I was instructed by my parents to do some chores.
    43. During class hours, I was instructed to take care of my siblings.
    44. During class hours, I need to work part-time to help with our family's finances.
    45. During class hours, I was instructed to help my other siblings in their lessons or assignments.
- School-based assistance
  - Adaptive teaching strategies
    46. My teachers displayed competent use of digital tools and online resources in class.
    47. Our lessons were adjusted to focus only on the most essential STEM competencies.
    48. My teachers applied gamification and other interactive activities in our lessons and/or assessments.
    49. My teachers provided enriched and relevant learning modules or instructional materials
    50. My teachers provided doable workplans or reasonable deadlines
    51. My teachers reduced our workload to accommodate requirements aligned most to STEM learning
  - Communication with teachers
    52. My teachers provided immediate feedback to our queries during online classes.
    53. During class hours, my teachers responded promptly to our queries or consultation requests
    54. My teachers were accommodating and easy to communicate with.
  - Technical support
    55. My teachers provided their assistance in resolving technical issues related to our digital tools.
    56. Our school offered a separate technical support or helpdesk to address our concerns.
  - Scholarship programs
    57. Our school offered scholarships to STEM students in most need.
    58. Our school offered financial assistance or discounts to academic-performing students.
- Financial Considerations
  - Financial capacity or struggle
    59. My family has no problems paying the tuition or required school fees.
    60. My family did not experience some form of financial struggle during the pandemic.
    61. I have worked part-time to pay my school fees or academic needs.
    62. I have received a scholarship or any form of financial assistance.
- Individual Learning Capabilities
  - Dealing with STEM subjects
    63. I had no problem learning STEM subjects i.e., Math, Chemistry, Physics, or Research
    64. I have experienced quality teaching from my STEM teachers.
    65. I have accessed quality tutorial videos to review concepts and calculations.
    66. I have accessed a virtual laboratory, augmented reality simulations, or interactive activities to better understand the lesson.
  - Self-studying
    67. I have managed to adapt to the new learning setup early on.
    68. I have dedicated ample time to study the provided learning materials.
    69. I managed to practice effective time management to accomplish tasks in a timely manner.
- External Learning Support
  - Peer mentoring, parent monitoring, and academic tutoring
    70. My friends were willing to help me with my studies.
    71. I have experienced virtual hangouts and group studies with my friends.
    72. My parents were available to help me with lessons I'm struggling with.
    73. My parents have the knowledge to help me with my studies
    74. My family is financially capable for me to afford after-school tutoring.
    75. My family is financially capable for me to avail academic servicing

The four (4) within-category indicators will be used to describe one's access and degree of experiencing a learning privilege within a specific major category. *Minimal capacity* refers to minimal to lack of access and experiencing of a learning privilege. *Limited capacity* refers to limited

and inadequate access and experiencing of learning privileges. *Moderate capacity* refers to moderate access and experiencing of learning privileges. *High capacity* refers to extensive access and experiencing of learning privileges. Table 2 shows the proposed scoring range per indicator.

Table 2
Scoring breakdown for Within-category indicators

	Technological Considerations	*Learning Resources*	*Overall well-being*	*Home-school balance*	*School-based assistance*	*Financial considerations*	*Individual learning capabilities*	*External learning support*
Minimal capacity	0 – 3	0 – 4	0 – 3	0 – 1	0 – 3	0 – 1	0 – 1	0 – 1
Limited capacity	4 – 6	5 – 8	4 – 6	2	4 – 6	2	2 – 3	2
Moderate capacity	7 – 9	9 - 12	7 – 9	3	7 – 9	3	4 – 5	3 – 4
High capacity	10 – 12	13 – 17	10 – 12	4	10 – 13	4	6 – 7	5 – 6

Correspondingly, four (4) descriptors were conceptualized, utilizing the categories of accessibility and degree of experiencing, to characterize the accessibility and degree of experiencing of specific learning privileges that STEM students had manifested and/or experienced during their pandemic school years:

Marginalized indicates that a student has minimal to lack of access or experience certain learning privileges. Based on the results, this could be due to lack of resources, lack of external intervention (i.e., family, friends, school, government), limited personal capabilities, and whenever applicable, some form of discrimination. The point range is considered low, with scores of 18 and below.

Socially Disadvantaged indicates that a student had limited and inadequate capacity or very limited access to and experiencing certain learning privileges. While there might be some resources to accommodate learning and basic educational opportunities available, they remain insufficient to provide a comprehensive learning experience during the pandemic. Thus, for the most part, alternative options were afforded to/by them. The point range is considered minimal, with scores of 19 to 37.

Limited Privileged indicates that a student had a moderate level of access to and experiencing of learning privileges described here. Some learning privileges may be accessible, but they might be limited in terms of their resources, personal capabilities, external intervention, and whenever applicable, form of discrimination. The point range is considered limited, with scores of 38 to 56.

Highly Privileged is primarily characterized by having extensive or substantial capacity, indicating that a student had a high level of access and experiencing of learning privileges described here. These STEM learners had received ample opportunities for education and access to a wide range of learning privileges during the pandemic. The point range is considered high, with scores of 57 to 75.

5. Concluding Remarks

At its preliminary underpinning, the learning privilege divide (refer to Figure 1 and Table 1) covers all three aspects of privilege discussed by Kolan and TwoTrees (2014). First, as the checklist is categorical, we can assess the categories where students were privileged or marginalized and conduct probing studies to understand its causes. Second, within the context of intersectionality, all items indicated in Figure 1 are theoretically unearned. Intersectionality recognizes and examines the interconnected nature of diverse social identities (in this case, learning privilege categories) and how they intersect to create unique experiencing of privilege, discrimination, or marginalization (Dancy et al., 2020; Pease, 2022). It acknowledges how individuals hold multiple social identities that interact and shape their experiences, and that systems of power and inequality are interconnected and mutually reinforcing. Third and last aspect, conceptualizing the within-

category indicators and learning privilege descriptors allowed for a more distinct understanding of one's position and privileges both on a meso- and macro- scheme.

By narrowing the scope to this specific population and educational domain, the researcher aimed to provide a targeted and comprehensive analysis of the privileges and dynamics at play within the STEM education landscape in the Philippines. As it remains a preliminary framework, it can be further improved to capture the larger student population, as well as students in need, and more importantly, to explore the implications of intersectionality across categories and existing dimensions of social privilege. Through this framework, the intent is to provide a structured and tangible means of exploring the complexities of privilege in the educational setting, enabling a deeper understanding of their experiences and implications to provide the most appropriate plans of action.

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