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Modular Distance Learning Modality and Students' Learning Mechanisms in Physics: A Grounded Theory

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Abstract

Issues in science education in the Philippines have existed until now. The existing learning issues are aggravated by the COVID-19 pandemic as the educational system shifts to a distance learning modality. With the sudden shift in learning modality, learning issues manifest, especially in subjects that require guidance from teachers, such as physics. This qualitative study aimed to explore and generate theory utilizing the Glaserian inductive method of theory generation, focusing on the learning mechanisms of learners in the modular distance learning modality in the subject of physics. The participants of the study were 10 purposefully chosen senior high school students who have taken General Physics 1 in the modular distance learning modality. Data were gathered through individual in-depth interviews and thematically analyzed utilizing the Braun & Clarke thematic analysis technique. The result indicated that the students are struggling to adapt to the learning modality set-up for acquiring learning needs and completing the given tasks. The result further shows that students' learning acquisition and task completion are driven by the following: support from knowledgeable others, use of learning materials, use of technology in learning, learners' intrinsic motivation to drive learning, and effective time management. Conclusively, when there is sufficient support from these emerging factors, physics learning acquisition and task completion in modular distance learning are maximized. Thus, Physics Learning Acquisition and Task Completion Model in Modular Distance Learning sheds light on how students learn physics in the said distance learning modality, which provides ideas on how physics learning material should be designed.

Keywords Grounded Theory, Physics Education, Modular Distance Learning, Learning Acquisition, Task Completion

INTRODUCTION

Science education in the Philippines has been facing issues, especially the performance of the learners [1], which was already existing even before the pandemic. This learning issue is aggravated by the COVID-19 pandemic, which forcibly drives the learning modality in basic education to distance learning. The disruptive change in learning modalities from face-to-face learning to distance learning manifests different issues, especially from the perspective of learners, which needs immediate understanding of the context. The Department of Education mandated the adoption of different learning modalities, which are discretionary for the respective schools' divisions. In the case of one of the school divisions in Region 8, Eastern Visayas, the learning modality adopted is the modular distance learning modality with TV and, as a supplement, manifested in their Learning Continuity Plan (LCP). In senior high school, physics was mentioned as one of the subjects that required mathematical and analytical rigor due to its abstract and complex nature [2]. On this ground, it is a must to understand the learners' learning mechanisms in the modular distance learning modality and look into the effect of the pandemic on the learning of students as well as the continuity of the learning process and opportunities that have been disrupted [3]. To some extent, the researcher wanted to explore and generate theory on the learning mechanisms of the students in physics

in one of the schools' divisions in Eastern Visayas to shed light on how the students mechanized themselves to learn physics in a modular distance learning modality.

The learning modality used in effect by the pandemic is in the form of distance education. This kind of means of learning historically started in Great Britain around the 1840s through postal services and correspondence [4]. Distance education allows the continuity of the learning process despite the separation between information and learners by means of distance and time, or the two [5]. Despite the said separation, learning resources are made accessible to learners in different forms, usually via the internet, which provides learners with access in their respective homes and through local libraries. To date, distance education is rampant on online platforms, where storage, distribution, and retrieval of learning materials as well as intercommunication between learners and teachers happen. For the continuity of learning, there are materials used in distance education that exist in different formats, such as TV, storage media, printable materials, conferencing, and a web-based learning environment [6].

Distance education and Learning material formats

The use of learning material in the context of distance education is very important because it acts as a mediator for the learning of the learners. Such learning material referred to is self-learning in design to communicate the information effectively to the learners [7]. In addition, learning materials that can be utilized in distance education include printable learning materials [6]. One of the printable materials that exist and are utilized in distance education is the self-learning module, wherein the learners tend to interact and learn. Learning modules are defined as unit work in each course of instruction that is self-contained to acquire learning and build skills. By design, the learning module should be compact in terms of information to manifest the desired outcomes, that is, to acquire learning and develop skills in relation to the course work. As reported, learning modules are said to be effective in acquiring learning and skills in the sense that learners define their own pace in the learning process. Despite the effectiveness of the module in teaching and learning, there is a necessity to provide feedback and reinforcements to the learners to elicit interest [8].

Physics education and Distance education

Despite the spread of distance education and the use of a modular approach, challenges are still inevitable, especially in the context of physics education [9]. Some of the challenges that may be considered are how the learners will be provided with practical experiences to hone their skills towards the application of the concepts in a real-life context. This challenge can, however, be addressed provided that the design of the material is timely and the equipment to be used is locally available at home for performance and practical purposes [10]. In addition, the use of ICT in physics education applied to distance education plays a significant role [11], as does the use of the internet and live broadcasts of the practical concepts [10].

Challenges of physics education in distance education

It is worthy of note that there is some research dealing with the distance education and the use of different distance learning approaches in physics education. Some of the research describes physics education in distance education as a way to maximize learning acquisition using different formats of delivery, such as modular and using the internet and ICT. Another research, however unpublished, describing the resilient mechanism in learning physics, which is grounded theory design, provided the necessity of positivity, persistence, and adaptation in the distance education set-up [12]. These studies, however, described only physics education and distance education at the tertiary level of education. Despite the existing research in the fields of physics education and distance learning, there is however no research dealing with the modular distance learning modality based on the open-source software that is used to mine research on different indexing sites. In addition, senior high school level and physics education in the context of qualitative studies show scanty studies; thus, there is a need to describe physics education and distance learning in modular modality delivery in the context of senior high school level.

The need of physics education study in distance learning: Senior high school level

With the learning modality adopted by one of the school divisions in Region VIII, students are to learn themselves with the help of the self-modules, information, and activity sheets (IAS) made by the teachers. Although parents were encouraged to guide the learners in the quest for the self-learning process, in the case of senior high school students, most parents have a hard time helping their respective students deal with the self-learning modules, especially those subjects that require the rigor of computations and analyses. Since physics is one of the subjects at the senior high school level that requires mathematical and analytical rigor, students have had a hard time.

This forced adoption of learning modality drives the researcher to explore the learning mechanisms of students in physics in self-learning processes. Understanding the learning mechanisms of students during their self-learning will contribute to a better design of modular learning delivery modes, especially in hard subjects. The aim of this study is to generate a theory about the students' learning in physics using a modular distance learning modality. Specifically, seek answers to the following: a) How do students feel about learning physics subjects through modular distance learning? b) How do students learn and accomplish tasks in physics through modular distance learning? c) What are the emergent factors in how students learn physics in the modular distance learning modality?

MATERIALS AND METHODS

The researcher adapted the Glaserian inductive method of grounded theory generation to analyze the responses of the participants to generate theory on the learning mechanisms of students in their physics subject, utilizing modular distance learning. The figure below shows the flow of theory generation [13].

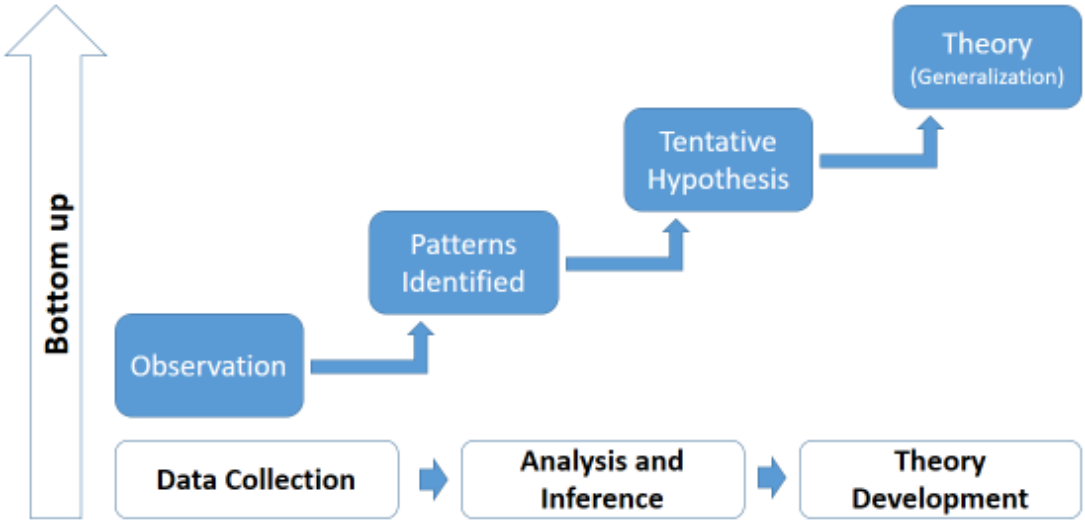

Figure 1. Flow of inductive method theory generation

The inductive method of inferring involves the identification of regular patterns that are similar and dissimilar, which will lead to broader or more general results on the phenomenon of interest [13]. This qualitative data analysis technique is used to identify patterns through the coding of the data gathered, which is basically anchored on the cognitive processes of classification and categorization [14]. The study was conducted in one of the schools in Region VIII, Eastern Visayas. The school is the only standalone senior high school in the division where it is located, offering most of the curricular offerings for the senior high school curriculum. One of the curricular offerings, is the STEM (Science, Technology, Engineering, and Mathematics) strand under the Academic track, wherein the researcher has chosen the participants of the study.

The participants of the study were purposively chosen by the researcher, who is a physics teacher at the said school. At least nine (9) participants were chosen and were involved in the study to satisfy the need for coding saturation [15]. The selected participants of the study were regular bona fide students at the

school in the STEM strand, taking general physics in the modular distance learning modality during the time of the study, and of legal age at the time the data were collected. Otherwise, the set criteria for inclusion are said to be excluded.

The main instrument in this study is the researcher [16]. The researcher utilized an open-ended, semi-structured interview guide. The interview guide questions were validated by experts in the field [17]. The validated semi-structured interview guide was used to interview the nine participants who met the inclusion and exclusion criteria. The participants were interviewed individually via Messenger; some were through a phone call, and the time of the interview was set according to the convenience of the participants. The collection of data commenced when the approved permit to conduct the study was secured from the school principal as a response to the researcher's request letter. Prior to the interview, a consent form was provided to the participants with a copy of the permit for them to agree on the terms of voluntary participation and the right to withdraw anytime during the interview. The interview was permitted by the participants to be audio-video recorded to maintain the quality of the data. The data in this study will target the coding saturation point, meaning that during the interview, the "have heard all" principle will be satisfied [18].

Coding is an essential part of this study in theory generation, which involves the process of identifying similar and dissimilar concepts and the recurrence of responses in the interview [19]. In this phase, the researcher listens to the recorded audio-video interview of the participants until the principle of "having heard all" is satisfied. After listening to the audio-video recording, the researcher transcribed the recording to initiate the preliminary coding and categorization process.

In dealing with the data analysis, constant comparative analysis of the transcription was employed. Constant comparative analysis is an important and primary strategy to be integrated into coding and analyzing data from the interview and is an important way to generate a rigid, grounded theory [20].

Another important consideration in dealing with qualitative research is memoing, which involves the process of deconstructing and reconstructing data from different sources [21]. This process is equally important in constant comparative analysis. In addition, field noting may also be used in the process of analysis. Field noting may, however, be different from memoing since the latter is involved in abstract meaning generation while the former is into showing what exactly is in the field. Despite their distinction, they both contribute to descriptive and interpretive analysis. On this ground, the researcher used memoing and field noting along the process of theory generation on the mechanisms of physics students in the modular distance learning modality.

In upholding utmost secrecy and confidentiality, the participants used pseudonyms to hide their identities and information in the data coding and analysis [22]. In view of this, pseudo-names were used in lieu of the real names of the participants, which may be reflected as the author of the responses.

Moreover, there are eight ways or methods in research practice mentioned in grounded theory [23]. This includes the following: participants guided the inquiry; checking of generated theory against participants' meanings; utilization of participants' actual words; articulating the researcher's personal view and insight into the phenomenon; specifying the criteria according to the researcher's thinking; specifying the criteria in choosing the participants; specifying the scope of research; and relating literature on the emerged categories. The participants of the study were carefully selected and must meet the included criteria to share their mechanisms as physics students in modular distance learning. The researcher maintains the suggested practice in ensuring the rigor of the study to delineate from Beck's schema of ensuring credibility, auditability, and fittingness, as cited [23]. In relation to the credibility, auditability, and fittingness of the data, the collected data were verified by cross-checking it from other sources, such as the teachers and teacher advisers' observations and records of the subject teacher in physics of the participants [24].

RESULTS AND DISCUSSION

Results

Grounded theory was originally conceptualized by Glaser and Strauss [25]. This method manifested purposely to define meaning from qualitative data to generate theory [26]. Anchoring the qualitative research on the premise of grounded theory has a sense of significance since the guidelines are explicit, techniques to use in handling analyses are established, and knowledge generation emanates from factual

data [27].

The primary data for the study emanated from the semi-structured interviews of the students' participants. In relation to the source of the data, thematic analysis is suggested to be used [28], wherein the interview results will be coded to manifest the themes. Coding refers to the identification of the meaning of the segments found in the data to make sense of the data, leading to the emergence of themes [29]. As mentioned, the coding process involves three steps: open coding, axial coding, and selective coding [30]. The first step of the coding process is open coding. In this step, the researcher identifies phrases or words taken from the transcription of the interview with significant sense. In this step, a total of one hundred thirty significant phrases were derived from the interviews, which were used in the next step of the coding process. Second is the axial coding; in this step, the researcher chooses appropriate terms that represent the coded words in representative meaning units. Third is selective coding, which is the emergent central code of the axial codes of coded data.

The responses of the students who have taken General Physics in Modular Distance Learning Modality, after careful examination and rigorous analysis, paved the way for the generation of the theory as shown in Figure 2. The model sheds light on the different factors affecting students' mechanisms for acquiring and completing physics tasks in the adopted learning modality. It also provided the relational interplay between and among factors that contribute to attaining success in the acquisition of learning in physics as well as in completing the tasks for the said subject.

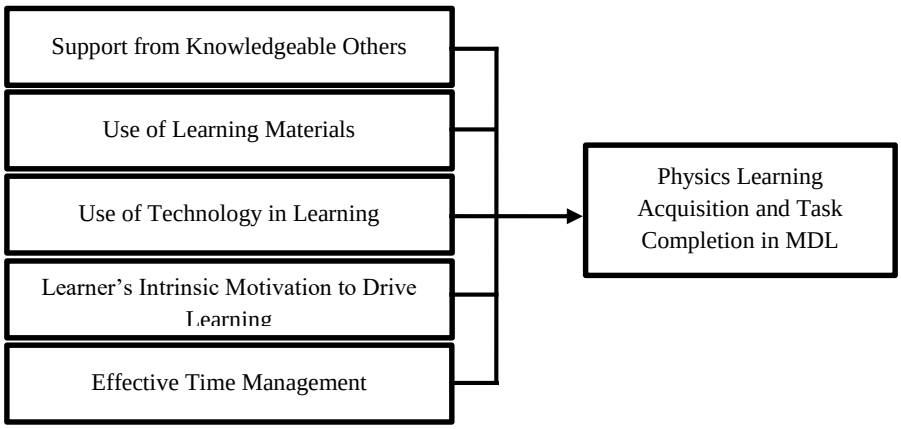

Figure 2. Physics Learning Acquisition and Task Completion Model in Modular Distance Learning

DISCUSSION

The prime manifestation of grounded theory is to make sense of the qualitative data [26]. Given the process made in the data analysis, the central code that primarily emerged is the endeavor of the students in physics learning acquisition and task completion in the modular distance learning modality. The attainment of the most essential learning competencies (MELC) provided by the Department of Education is manifested in the rate of accomplished tasks found in each weekly module. In the current modality implemented, the main basis for the teachers' assessment of the learning acquisition of the learners is their task completion. This means of learning assessment is generally true since there is an association between the knowledge acquisition of learners and the completed task of the learners [31]. The task completion of the students is, however, related to the different factors identified as the themes, namely: knowledge of others, learning material content, technology in learning, learners' intrinsic motivation, and time management.

Theme 1: Support from Knowledgeable others

The analysis manifested the knowledgeable others as one of the key players in learning the subject as well as the task accomplishment in modular distance learning. As cited, knowledgeable others refer to those adults or peers who provided guidance to bridge the learning process and its manifestations [32]. In this study, there were identified individuals who are considered knowledgeable others, namely: teachers, family,

friends, peers, and classmates.

***Teacher*:** Participants cited that teachers play an important part in the acquisition of learning, especially in physics. This claim is, in fact, supported by some review studies [33]. The literature review revealed that the positive relationship between teachers and students influences the learning of the students.
Family: In the quest for learning acquisition, family or family members are as knowledgeable as others, and their support is essential. In fact, a research report emphasized the impact of parental support on the achievement of the learner. As reported, parental support and involvement in the learning process play a significant role in how the students acquire knowledge along the way [34].

Friends, Peers, and Classmates: Social interactions and learning are non-separable aspects of human life [35]. In relation to the results, participants tend to interact with others to manifest their tasks as well as to learn from each other. In times of need, the students tend to communicate with others, such as friends, peers, and classmates. The learners communicate and connect with each other to effectively manifest their targets, learn, and perform the tasks given to them. This tendency of learners' interaction with others for learning is deemed to be a surfacing phenomenon among learners [36]. In addition, classmates and friendship groups play an important role in the self-regulated learning of the learners [37] [38].

Hypothesis 1: If more support is given by knowledgeable others, then the more the students learn.
Proposition 1: Support from knowledgeable others provides opportunities for learners to learn physics in a modular distance learning modality.

Knowledgeable others, in the context of learning, provide that a learner needs someone who is more knowledgeable to maximize the acquisition of knowledge. This idea is in line with Vygotsky's zone of proximal development, which says that the learning of the student is catalyzed whenever there is help from others, especially teachers and parents. Thus, in the modular distance learning modality, the design of the learning material must be put into prime consideration to promote the way learners learn with someone who may guide them along the process.

Theme 2: Use of Learning Materials

The success of learning acquisition and manifestation of learning tasks are said to be associated with the learning materials provided based on the emerging concept after analysis. For emphasis, learning materials play an important role in the learning acquisition of the students and eventually in the achievement of academic goals and promotion [39]. In this theme, emerged sub-themes manifested associated with learning material, such as the sufficiency of the information and the learning tasks included in the material.

Information sufficiency: Sufficiency of the information in the learning material plays an important role in relation to students' acquisition of knowledge. The development of learning materials should consider the systematic designs that should include the content for the sustainability of learning [40]. The concept of the use of learning material and the content are of utmost consideration [41].

Learning Tasks: In modular distance learning, the primary way to assess the learning of the students is through the manifestation of the learning tasks. As cited, students' learning is evidenced by the students' assessment task results, which should be delineated from the desired outcome [42]. In this research, however, students emphasized that aside from the delineation of tasks, the volume should be reduced. It is even suggested that the preference of the students' tasks be modified to suit the context [43]. This implies that the task to be given to the students should suit the pandemic context and be minimal in order not to compromise their learning.

Hypothesis 2: If sufficient learning material is provided, then the more the students learn.
Proposition 2: Learning materials provide information in physics for students to learn in a modular distance learning modality.
In the context of the learning process, regardless of the learning modality, learning material plays an important role in promoting learning acquisition. Apparently, learning materials served as the immediate

source for learning physics, especially in the modular distance learning modality. With this, the design of the learning material and its contents should be put into prime consideration in such a way that it is designed to maximize the learning advantage of the learners. Learning content must be designed in such a way that it is easily understood, and the tasks included in self-learning modules should not be too much for the students to work on to balance with other subjects in the said modality.

Theme 3: Use of Technology in Learning

One of the catalysts for learning is the use of technology during the teaching and learning process [2]. Based on the responses of the students, technology is of help to them in doing the task asked as well as in acquiring information. Some studies show that the impact of technology in education is beneficial to learning, especially if the use is delineated to what is to be learned [44]. In addition, another application of technology is to be used in communication for information exchange and eventual learning [45].

Learning Gadgets: As defined, physical technology pertains to a form of tangible technology that can be put to purposeful use; an example is a gadget. In the context of education, gadgets play a significant role in the learning process as they provide access to information, which is then associated with learning acquisition [46]. Using gadgets, learners are able to acquire and learn at their own pace [47].

Educational Websites: The learning modality set of the students in the pandemic drives them to look for other information sources, such as educational websites; an example of such is YouTube.com and Khan Academy. In times when the information provided by the learning material is insufficient, students would have to find ways to fill in the information gap using educational websites. A study emphasized the significance of educational websites to the learning acquisition of the learners [48], and this was evident from the perspective of the students as well [49].

Hypothesis 3: If technology is utilized in modular distance learning, then it favors ways of learning acquisition.
Proposition 3: The use of educational technology in modular distance learning enables students to learn and comply with tasks in physics.

In the context of learning during a pandemic, technology plays a significant role in the process of learning acquisition, especially with the use of gadgets and the internet. These two technology products greatly impacted how students find ways to manifest information in their reach to feed themselves with the required learning and to do tasks in the modular distance learning modality. To some extent, learning material designers can provide additional learning sources, such as links to the internet, to expand the coverage of learning resources.

Theme 4: Intrinsic Motivation to Drive Learning

As mentioned, intrinsic motivation refers to motivation that is driven by an interest or enjoyment in the task itself and exists within the individual rather than relying on any external pressure [50]. In this study, the participants' mechanisms of knowledge acquisition and complying with the task are also driven by the intrinsic motivation of the students as well as their adjustment to the environmental learning setup.

Self-regulation for learning: The learning process is determined by how the individual manifests himself in the quest for knowledge acquisition and is associated with the learner's self-regulation and optimism toward learning. Self-regulation is said to be an important factor in the learning process; in fact, it is significantly related to the academic achievement of learners [51]. The modular distance learning modality set-up allows the students to find another means and opportunity for learning acquisition to happen. One of the participants even conditioned himself by making what he desired a reward after finishing the task given. In this manner, the student can create a welcoming environment for learning that drives motivation [52].

Adept in learning environment: The learning environment is one of the important factors to be considered in the learning acquisition process [53] [54]. In the normal face-to-face classroom setup, the learning environment is controlled, unlike the learning environment of the students in the modular distance learning

setup. Participants shared that the shift in learning modality caused them to make a lot of adjustments. One of the adjustments they made was the learning environment in their respective places.

Hypothesis 4: If the learners' intrinsic motivation is delineated to learning, then their desire for learning and task completion increase.
Proposition 4: Learners' intrinsic motivation for physics pave the way to learning and their desire to complete tasks in the modular distance learning modality.

Motivation plays an important role in the learning process, which is driven by extrinsic and intrinsic means. With a pandemic where the world of learners revolves only around their home, learning acquisition is compromised as the external environment may drive distortions in the conduciveness of the environment to learning. As to this matter, boosting the morale of the learners should also be put into consideration to effect intrinsic motivation despite distractions and drive self-learning regulation, leading to learning acquisition.

Theme 5: Effective Time Management

The essence of time in acquiring learning can never be invalidated, especially in the context of distance learning [55]. In this study, participants shared how they struggled to finish the tasks given to them. Their struggles are associated with the appropriation of tasks, particularly in the daily household chores and learning tasks in the module. The divisive tasks made them unable to comply and submit on time. However, some of the participants have good time management; hence, on-time submissions of outputs are achieved. The polarizing results of time management towards learning and task completion are attributed to their ways of appropriating their tasks between household activities and learning tasks. A study recommended that the students must have self-discipline, willingness, and motivation to learn to effectively attain the target of the learning process [56].

Time allocation: In a study, it was emphasized that the learners needed to appropriately allocate their activities according to time [56]. They also suggested that to manifest higher success in appropriation of their activities, logging of activities could be one of the ways. This method is to monitor the personal work versus the school tasks, especially in the setup of distance learning. However, some of the participants noted that home tasks and school tasks are kind of mixed up and the ratios of time spent are inconsistent, which is why they have a hard time accomplishing schoolwork. In contrast, other participants shared that to finish their schoolwork, they must adjust the time spent doing schoolwork, which is devoted to the night. One of the participants emphasized that doing schoolwork at night is best for him because there are minimal distractions. These manifestations of the participants are associated with attaining the goal, which is not a factor of available time but of the use of time [57].

Time Sufficiency: In the quest to finishing the school tasks, students find it difficult in physics subject. According to most of the participants, they have a hard time comprehending the materials provided for the subject. In fact, other students tend to answer the learning task in the physics last since it requires them a lot of time, others even take a week to finish. However, the demand of the sufficiency of time in answering the module is still falls in time management of the students [56]

Hypothesis 5: If time is efficiently managed, then learning task completion will be on time.
Proposition 5: Time management is essential to learning physics and task completion in modular distance learning modality.

Learning activities are always a function of time. In the wake of the sudden change in learning modality, the time mechanisms of the students were also affected, especially by different distracting activities at home, thus compromising the time of learning acquisition. As to this matter, the learning material's contents and tasks must be considered such that it would not take too much time, especially since the task in physics really requires time to work on. It is better to design tasks that would take time within the span of focus of the learners in order not to demotivate them to learn and to do tasks.

Theory Generation

The pandemic greatly affected the education sector worldwide, forcing learning institutions to shift to a new learning modality in lieu of face-to-face learning. In the Philippines, the Department of Education adopted the distance learning modality, in which schools' divisions are given flexibility as to what learning modality is to be adopted [58]. The modular distance learning modality implemented by the said school in Region VIII drives the students in the way they learn, rather than the way they learn in a face-to-face setting.

Based on the careful examination of the participants' responses, it is profound that the students have hard time in acquiring the learning and to carry out the learning tasks, especially in the subject physics. The emerging core theme after careful coding the is the Learning Acquisition and Task Completion in the Modular Distance Learning modality of which there exist multi-factorial considerations manifested in the thematic analysis.

In the modular distance learning modality, learners and teachers' interaction in the teaching and learning process is defeated. As a result, students must seek out other people who can help them understand the concepts they must learn (Theme 1). People who are considered knowledgeable or knowledgeable others play an important part in the students learning process in the said modality. The students in the modular distance learning modality set-up plainly rely on the learning materials provided by the teachers to them (Theme 2). In relation to this, learning modules are the only material the students may refer to to satisfy their needs to carry out the learning task given to them. Despite the provision of the learning materials, considerations of content and sufficiency must be of equal concern. For those modules wherein the information is considered insufficient, students tend to find ways to fill in the gap of information by utilizing the available technology in the quest for learning acquisition (Theme 3). In modular distance learning, learning technology plays an important role, especially in cases where the learning guide does not explicitly elaborate on the concepts to be learned. Learning websites, such as Khan Academy and YouTube.com, were also the partners of the students in their quest for learning using their learning gadgets, such as mobile phones.

Those thematic factors (Themes 1, 2, and 3) are external factors that help students to catalyze learning acquisition and task completion in the modular distance learning modality. On the other factorial side, intrinsic motivation and mechanisms of the students play a role in their quest for learning acquisition and task completion (Theme 4). The intrinsic motivation of the learners towards learning served as one of the factors that drove them to carry out the tasks and acquire knowledge. Such an intrinsic mechanism is a function of the student's self-regulation and being adept to the new learning setup. The more the students are self-regulated to learn and very adept to the learning setup, the higher the success of learning is manifested and the eventual completion of the learning tasks. Along the way of the learning process, the element of time management can never be invalidated (Theme 5). Despite the demand of the students on the sufficiency of time that should be devoted for the task, it is noted by Sainz et al. (2019) that the use of time is a function of the student's desire for the use of time.

CONCLUSION

Learning physics in a modular distance learning modality was not an easy endeavor that students were taking on. There are different struggles, such as the need for knowledgeable others to better understand the learning materials, motivation towards learning and task accomplishments, and time spent doing tasks. These struggles were wrestled by the students in their plights during the pandemic. Despite these hurdles, students find ways to mechanize themselves and surpass them. The Physics Learning Acquisition and Task Completion in MDL model sheds light on how learners surpass the hurdles to learn physics and accomplish the tasks in the shadow of the modular distance learning modality. The shift in learning modality has driven the learners to find new ways to gain and acquire learning that are manifested in different factors to surpass the learning challenges. The different factors contributing to success in acquiring knowledge and completing the tasks are the following: knowledge of others, learning material content, technology in learning, learners' intrinsic motivations, and time management. The result implies that the sufficiency of support from the five contributory elements to learning physics in the modular distance learning modality favors learning acquisition and task completion and is said to be maximized. It is recommended that these emerging

elements be integrated into the design of the modular format to maximize interaction between the material and the learners in the said modality.

REFERENCES

[1] TIMSS 2019 Encyclopedia: Education policy and curriculum in mathematics and Science TIMSS 2019 Encyclopedia: Philippines. Available at: https://timssandpirls.bc.edu/timss2019/encyclopedia/philippines.html (Accessed: 2022, May 23

[2] Yunzal, A., Casinillo, L. (2020). Effect of Physics Education Technology (PhET) Simulations: Evidence from STEM Students' Performance. *Journal of Educational Research and Evaluation*, 4(3), 221-226. https://doi.org/10.23887/jere.v4i3.27450

[3] Onyema, E. M., Eucheria, N. C., Obafemi, F. A., Sen, S., Atonye, F. G., Sharma, A. & Alsayed, A. O. (2020). Impact of Coronavirus Pandemic on Education. *Journal of Education and Practice*, 11(13), 108-121. https://doi.org/10.7176/JEP/11-13-12

[4] Buselic, M. (2012). Distance learning – Concepts and contributions. *Oeconomica Jadertina*, 2(1), 23-34. https://doi.org.10.15291/oec.209

[5] Honeyman, M. & Miller, G. (1993). Agriculture distance education: A valid alternative for higher education?. *Proceedings of the 20th Annual National Agricultural Education Research Meeting*, 67-73. Islamabad: National Book Foundation.

[6] Sadeghi, M. (2019). A shift from classroom to distance learning: Advantages and Limitations. *International Journal of Research in English Education*, 4(1), 80-88. https://doi/10.29252/ijree.4.1.80

[7] Jayaram, K. & Dorababu, K. (2015). Self-learning materials in distance education system. *International Journal of Current Research*, 7(10), 21929-21934. Available online at http://www.journalcra.com

[8] Sadiq, S. & Zamir, S. (2014). Effectiveness of Modular Approach in Teaching at University Level. *Journal of Education and Practice*, 5(17), p103-109. Available at: https://www.iiste.org/Journals/index.php/JEP/article/view/13916/14068

[9] Shott, M. (1985). Teaching Physics at a distance. *Distance Education*, 6(1), 102-127, https://doi.org/10.1080/0158791850060107.

[10] Long, J. M., Stannard, W. B., Chenery, K. & Joordens, M. A. (2012). Physics practicals for distance education in an undergraduate engineering course. *Australian Association for Engineering Education*. Melbourne.

[11] Eckert, B., Grober, S. & Jodl, H. J. (2009). Distance Education in Physics via the Internet American *Journal of Distance Education*, 23(3) 125-138. https://doi.org/10.1080/08923640903076735

[12] Mercado, J. (2022, May 23). Resilient Mechanism in Learning Modern Physics: A Grounded Theory [Unpublished thesis]. Retrieved from: https://www.researchsquare.com/article/rs-690636/v1

[13] Stojanov, Z. (2016). Inductive Approaches in Software Process Assessment. *International Conferences on Applied Internet and Information*. https://doi.org/10.20544/AIIT2016.I01

[14] Karl J. K., & Phye, G. D. (2008). Inductive reasoning: A Training Approach. *Review of Educational Research*, 78(1), 85-123. https://doi.org/10.3102/00346543073134

[15] Hennink, M., Kaiser, B. N., Maconi, V. C. (2017). Code saturation versus meaning saturation: How many interviews are enough?. *Qualitative Health Research*. 27(4), 591-608 https://doi.org/10.1177/1049732316665344

[16] Bahrami, N., Soleimani, M. A., Yaghoobzadeh, A., & Ranjbar, H. (2016). Researcher as an Instrument in Qualitative Research: Challenges and Opportunities. *Advances in Nursing & Midwifery*, 25(90), 27-37. Retrieved from https://journals.sbmu.ac.ir/en-jnm/article/view/11584

[17] Escobar-Pérez J. & Cuervo-Martínez A. (2008). Content validity and expert judgment: An approach to its use. *Advances en Medecion*, 6(1), 27-36. https://doi.org/10.3390/nu12041136

[18] Aldiabat K. M. & Le Navenec, C-L. (2018). Data saturation: The mysterious step in Grounded Theory Methodology. *The Qualitative Report*, 23(1), 245-261. https://doi.org/10.46743/2160-3715/2018.2994

[19] Tie, Y. C., Birks, M., & Francis K. (2019). Grounded theory research: A design framework for novice researchers. *SAGE Open Medicine*, 7(1), 1-8.

[20] Abadiano, M. N., Bonotan, A., & Makilling,V. (2014). The dynamics of netizens' information-sharing in social media: Why do we share information in social media?. *International Journal of Interdisciplinary Research and Innovations*, 2(3), 30-55.

[21] Mongomery, P., Bailey, P. H. (2007). Field notes and theoretical memos in grounded theory. *Western Journal of Nursing Research*, 29(1), 65-79. https://doi.org/10.1177/0193945906292557

[22] Petrova E., Dewing J., & Camilleri M. (2016). Confidentiality in participatory research: Challenges from one study. *Nursing Ethics*, 23(4), 442-54. https://doi/10.1177/0969733014564909

[23] Chiovitti R. F., Piran, N. (2003). Rigour and Grounded Theory Research. *Journal of Advanced Nursing*, 44(4), 427-435. https://doi.org/10.1046/j.0309-2402.2003.02822.x

[24] Aguilar-Solano, M. (2020). Triangulation and Trustworthiness—Advancing Research on Public Service Interpreting Through Qualitative Case Study Methodologies. *FITISPos International Journal*, 7(1), 31-52. https://doi.org/10.37536/FITISPos-IJ.2020.7.1.249

[25] Charmaz, K. (2008). Constructionism and the Grounded Theory. In J. A. Holstein, Handbook of Constructionist Research (pp. 397-412). New York: The Guilford Press.

[26] Glaser B. G. & Straus A. L. (2017). The Discovery of Grounded Theory: Strategies for Qualitative Research. USA: Aldine Transaction.

[27] Charmaz, K. (2006). Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis. *SAGE Publications Ltd*.

[28] Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2) 77-101. https://doi.org/10.1191/1478088706qp063oa

[29] Skjott Linneberg, M. & Korsgaard, S. (2019). Coding Qualitative Data: A Synthesis Guiding the Novice. *Qualitative Research Journal*. 19 (3), 259-270. https://doi.org/10.1108/QRJ-12-2018-0012

[30] Gingoyon, E. & Abadiano M. (2022). Online Social Connectedness: A grounded Theory. *Journal of Positive School Psychology*, 6(3), 6184-6201

[31] Wang Y, Chen A, Schweighardt R, Zhang T, Wells S, & Ennis C. (2019). The nature of learning tasks and knowledge acquisition: The role of cognitive engagement in physical education., 25(2), 293-310. https://doi.org/10.1177/1356336x17724173

[32] Shabani, K., Khatib, K., & Ebadi, S. (2010). Vygotsky's Zone of Proximal Development: Instructional Implications. *Canadian Center of Science and Education*, 3(4), 237-248.

[33] Al Nasseri, Y. S., Renganathan, L., Al Nasseri, F., & Al Balushi, A. (2014). Impact of Students-Teacher Relationship on Student's: A Review of Literature. *International Journal of Nursing Education*, 6(1), 167-172. https://doi.org/10.5958/J.0974-9357.6.1.034

[34] Desforges, C. & Abouchaar, A. (2003). The Impact of Parental Involvement, Parental Support and Family Education on Pupil Achievement and Adjustment: A Literature Review. Queen's Printer.

[35] Bloch, M., Lave, J., & Wenger, E. (1994). Situated Learning: Legitimate Peripheral Participation. Man, 29(2). https://doi.org/10.2307/2804509.

[36] Finch, J. E., Garcia, E. B., Sulik, M. J. & Obradović, J. (2019). Peers Matter: Links Between Classmates' and Individual Students' Executive Functions in Elementary School. *American Educational Research Association*, 5(1), 1-14. https://doi.org/10.1177/2332858419829438

[37] Senior, C & Howard, C. (2014). Learning in friendship groups: developing students' conceptual understanding through social interaction. *Frontiers in Psychology*, 5(1), 1-8. https//:doi.org/10.3389/fpsyg.2014.01031

[38] Jones, M., Estell, D. & Alexander, J. (2008). Friends, classmates, and self-regulated learning: discussions with peers inside and outside the classroom. *Metacognition Learning*, 3(1), 1-15. https://doi.org/10.1007/s11409-007-9007-8

[39] Kaphur, R. (2020). Teaching-Learning Materials: Significant in Facilitating the Teaching-Learning Processes. *Researchgate*.

[40] Kangpheng, S., Kunlong,S., Mityodwong, S., Sirikul, P & Buddeevong, C. (2018). A Development of Systematic Learning Resources Management Process to Strengthen Sufficiency Attributes of Secondary School Students. *International Education Studies*, 11(12), 42-48. https://doi.org/10.5539/ies.v11n12p42

[41] Ajoke, A. R. (2017). The Importance of Instructional Materials in Teaching English. International *Journal of Humanities and Social Science Invention*, 6(9), 36-44. www.ijhssi.org

[42] El-Maaddawy, T, & Deneen, C. (2017). Outcomes-Based Assessment and Learning: Trialling Change in a Postgraduate Civil Engineering Course. *Journal of University Teaching and Learning Practice*, 14(1). Available at http://ro.uow.edu.au/jutlp/vol14/iss1/10

[43] Hua, Y., Lee, D., Stansbery, S., & McAfee, J. (2014). The Effects of Assignment Format and Choice on Task Completion. *Journal of Education and Learning*, 101-110. http://dx.doi.org/10.5539/jel.v3n1p101

[44] Higgins, S., Xiao, Z. & Katsipataki, M. (2012). The Impact of Digital Technology on Learning: A Summary for the Education Endowment Foundation. Durham University.

[45] Kaphur, R. (2019). Advantages of Technology. *Researchgate*.

[46] Bayanova, A. R., Kuznetsov, V. V., Merculova, L. V., Gorbunova, L. N., Pervozvanskaya, O. A., Shalamova, O. O., & Vorobyova. C. I. (2019). Student Performance Interrelation with Gadget Journal of Environmental Treatment Techniques, 7(3), 432-437. : http://www.jett.dormaj.com

[47] Singaravelu, G. (2014). Impact of gadget-based learning of grammar in English at Standards II. *Journal on English Language Teaching*, 4(2), 33-39. Available at: https://eric.ed.gov/?id=EJ1068432

[48] Ihmeideh, F. (2019). Evaluation of children's educational websites based on the developmental perspective. *E-Learning and Digital Media*, 16(1), 26-45. https://doi.org/10.1177/2042753018812686

[49] Dogruer, N., Eyyam, R. & Menevis, I. (2011). The use of the internet for educational purposes. *Ocedia - Social and Behavioral Sciences*, 28(1), 606-611. https://doi.org/10.1016/j.sbspro.2011.11.115

[50] Singh, K. (2011). Study of Achievement Motivation in Relation to Academic Achievement of the Students. *International Journal of Educational Planning & Administration*, 1(2), 161-171. Available at: https://www.ripublication.com/ijepa/ijepav1n2_8.pdf

[51] Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational psychologist*, 25(1), 3-17. https://doi.org/10.1207/s15326985ep2501_2

[52] Tanti, T., Maison, M., Syefrinando, B., Daryanto, M., & Salma, H. (2020). Students' self-regulation and motivation in learning science. *International Journal of Evaluation and Research in Education*, 4(9), 865-873. http://doi.org/10.11591/ijere.v9i4.20657

[53] Stadler-Altman, U. (2015). Learning environment: The influence of school and classroom space on education (pp. 547-571). *ResearchGate publications*.

[54] Ahmad, C. N. C. & Amirul, N. J. (2017). The effect of the physical learning environment on students' health, enjoyment, and learning. *Jurnal Pendidikan Sains & Matematik Malaysia*, 7(1), 47-55. https://doi.org/10.37134/jpsmm.vol7.no1.4.2017

[55] Onuka, A. O. (2012). Distance Learners' Time Management and Learning Effectiveness. In T. Stoilov, Time Management (pp. 77-88). Intechopen.

[56] Foltynek, T. & Motycka, A. (2009). Time Management in E-learning. *Research, Reflections, and Innovations in Integrating ICT in Education*, 250-254.

[57] Sainz, M. A., Ferrero, A. M., & Ugido, A. (2019). Time management: Skills to learn and put into practice. Education + Training. https://doi.org/10.1108/ET-01-2018-0027

[58] Department of Education. (2020, July 1). DepEd prepares Self-Learning Modules for education's new normal [Press release]. https://www.deped.gov.ph/2020/07/02/deped-prepares-self-learning-modules-for-educations-new-normal/