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The Impact of Self-Paced Learning on Motivation and Focus in General Mathematics During the COVID-19 Pandemic

Georgette C. Bicoy
Northwestern Mindanao State College of Science and Technology, Labuyo, Tangub City
E-mail: georgette.bicoy@nmsc.edu.ph, Orcid: https://orcid.org/0009-0008-0146-9464

Norvel L. Matchon
Northwestern Mindanao State College of Science and Technology, Labuyo, Tangub City
E-mail: norvel.matchon@nmsc.edu.ph, Orcid: https://orcid.org/0009-0005-2107-9031

Melissa P. Manon-og
Northwestern Mindanao State College of Science and Technology, Labuyo, Tangub City
E-mail: melissa.manon-og@nmsc.edu.ph, Orcid: https://orcid.org/0009-0005-8807-8420

Cris A. Bocala
Northwestern Mindanao State College of Science and Technology, Labuyo, Tangub City
E-mail: cris.bocala@nmsc.edu.ph, Orcid: https://orcid.org/0009-0000-5667-6163

Loreen O. Tagalogon
Northwestern Mindanao State College of Science and Technology, Labuyo, Tangub City
E-mail: loreen.tagalogon@nmsc.edu.ph, Orcid: https://orcid.org/0009-0003-1799-0637

Leonel B. Bayadog
Northwestern Mindanao State College of Science and Technology, Labuyo, Tangub City
E-mail: leonel.bayadog@nmsc.edu.ph, Orcid: https://orcid.org/0009-0000-3201-5854

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Abstract

Background and Aim: Self-paced learning has been implemented in the Philippines through modular distance learning under the COVID-19 pandemic, and its impact on students' academic behavior, specifically in Mathematics, has disrupted the traditional educational setup. The purpose of this study was to identify the influence of self-paced learning on Grade 11 pupils ' General Mathematics academic behavior, in terms of readiness, motivation, and attention.

Materials and Methods: A Descriptive correlational design was used based on the data gathered from 203 randomly chosen respondents among the 425 grade-11 students in Tangub City National High School. Validated surveys assessed students' self-pacing readiness and academic behavior (motivation, focus, attention). Data were treated with Descriptive analysis and the Pearson Product-Moment Correlation Coefficient.

Results: They were in the third study with respect to self-paced readiness (M = 2.54) and did grow at a slower rate in their willingness to view math ability (M = 2.31). Motivation (M = 2.99) and focus and attentiveness (M = 2.82) were rated as high academic behavior domains. Readiness was significantly correlated with motivation ($r = 0.452$, $p < 0.01$) and focus and attention ($r = 0.529$, $p < 0.01$). That means readiness enhancement is linked to a 45%–53% increase in the most desirable school behaviors.

Conclusion: The results substantiate that self-paced learning has a positive impact on students' academic behavior, mainly in motivation and focus, but there are still gaps regarding confidence in mathematics. What is new in the present study is that modular self-paced learning was related to behavioural outcomes in crisis education. Theoretical and Practical implications include designing self-learned materials with differentiation, strengthening behavioral observation in teacher dream training, and cognitive load control, in addition to encouraging involvement. These findings have important implications for educational recovery in the post-pandemic period and flexible blended instruction in Mathematics.

Keywords: Self-paced learning, Academic behavior, Motivation, Focus, Mathematics education, COVID-19

Introduction

One of the basic requirements that a person could have is education. It's also a fundamental right, established in 1984 as part of the Universal Declaration of Human Rights (UDHR), Article 26, that everyone has the right to an education. During the outbreak of COVID-19, the education system was

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profoundly influenced. Pandemic-related school closures sparked the era of pandemic education in a country already millennia behind on educational progress. This intense disruption was experienced by countless families across the globe as home schooling strategies were a burden on parents' job effectiveness and students' social life and education (Burgess et al., 2020). The Department of Education, in turn, largely turned traditional face-to-face learning into self-paced learning. This transition was necessary in order to keep the education system running, but it also brought various challenges both for learners and teachers who had to adapt to the "new normal". Self-paced learning differs from the typical teacher-led, whole-class lesson in that it permits students to personalize their study using materials and resources. It allows students to create their own learning not only at their own pace, but wherever they learn and choose how they learn (Stanley, 2019). Self-paced instruction is when students work at their own pace on a given Learning Objective. In the Philippines, the modular self-paced learning approach was used, in which learning materials (modules) were supplied to learners, and they just had to answer them at their own time. This autonomy offered flexibility, but added up to quite a challenge—about the only thing that could be done independently at home was reading (CCSS-ELA-Literacy), aside from homework in Mathematics, where we encourage peer interaction and teacher instruction (Headden, 2013).

Academic behaviors are the main mediating process that underlie the effect of mindsets on academic achievement. Achievement gains may also require academic behavior to improve, which includes persistence, motivation, and attention (Snipes et al., 2017). Mathematics, as a discipline, is taught not only through reasoning and problem solving but also by behaviors and attitudes toward the subject. Researchers stress the fact that students' behaviour is an essential factor in mathematics performance (Sanchal et al., 2017). Learners' achievement in Mathematics is influenced by their motivation to learn, persistence against obstacles, and academic conduct (Langat, 2015). Nevertheless, while previous studies have addressed self-paced learning in a broader sense, there is still limited research that examines how the modularity of self-paced learning due to COVID-19 affected students' motivation and focus in relation to their Mathematics lessons. This lack is important, since it can be that the Mathematics learning is an endeavor and confidence-demanding task, which might be strained in digital self-regulated environments. Hence, this research aimed to investigate the influence of self-regulated learning on Grade 11 General Mathematics students' academic behaviour during the COVID-19 pandemic. It seeks to examine how readiness in self-paced learning affects motivation and concentration, thus addressing a significant gap in the literature. These findings intend to offer evidence-based suggestions for teachers in solving adaptive instructional material, advice for parents accompanying their children's learning, and policy guidance when revitalizing flexible learning systems for post-pandemic education.

Objectives

This study aimed to determine the effect of self-paced learning on grade 11 students' academic behavior in General Mathematics. Specifically, it seeks to answer the following questions:

1. What is the level of students' readiness in self-paced learning?
2. What is the student's academic behavior?
   2.1. Motivation; and
   2.2. Focus and Attention

Literature review

One of the fields in education that has been most influenced by behavior analysis is child development. A variety of learning is crucial in education for subsequent world engagement. Optimistic and pessimistic, independent and dependent, sensitive and unemotional—all the personality qualities of one child are inversely opposite to those of another. Some of these traits are inherent, while others, such as aggressiveness or laid backness, feeling competent and incompetent, seem to be learned, all depending on the trials and help that someone is provided (Rogel, 2012).

Cognitive learning theory: Jean Piaget. Cognitive learning theory focuses on how learners gather knowledge and not on an answer. Intelligence is shaped by adaptation as children develop, using the

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crucial tasks of assimilation and accommodation (McLeod, 2020; Reis, 2016). In a self-paced, modular learning environment, students are required to integrate new mathematical ideas with previously learned schemas and adjust current practices in response to the flexibility of personalized instruction. This theory enables us to see how the student readiness research question—being able to modulate and regulate one's own learning behaviors—mirrors Piaget's stance on knowledge construction.

Behaviorism, on the other hand, traces its origins to such figures as Ivan Pavlov and was extended by John B. Watson in viewing how behaviors can be observed, reinforced, and shaped through stimulus-response conditioning (Picciano, 2017). Repetition of modular tasks is a means of shaping the student behavior in terms of concentration, perseverance, and the time they spend on a particular task within self-paced learning. This link offers a behavioral basis for the finding that readiness is associated with students' attention and focus in modular classrooms.

The study also applies Self-Determination Theory (Deci & Ryan, 1985) to examine more about student motivation. According to SDT, autonomy, competence, and relatedness are the key dimensions for sustaining motivation. Modularity and self-paced learning environments grant autonomy, yet mathematical competence and social support play important roles in maintaining motivation. As such, this framework helps explain the finding in the current study that students demonstrated relatively high levels of motivation but low confidence for mathematics—autonomy was facilitated for them, but their sense of competence needed to be developed.

The present paradigm used to guide education curricula acknowledges that knowledge is created, uncovered, and extended by student–learners as they play with the appropriate pace and feelings within an environment of constructivist learning (Butler, 2016; Dick et al., 2014; Anderson, 2006). The modular form of CSP was implemented, and as a result, students learned in less favorable environments, leading to academic behavior problems, specifically in Mathematics. Learning and Behaviour in Mathematics According to Sanchal et al. (2017), researchers have always found that the academic behaviour of students is critical in learning mathematics.

Collectively, Piaget's Cognitive Learning Theory offers a cognitive-behavioral explanation of students' self-regulation strategies in self-paced learning, Pavlov's Behaviorism explains how academic behaviors, such as focus and persistence, are reinforced (and extinguished), and Self-Determination Theory extends this understanding to account for associated motivational effects when autonomy is supported and competence promoted. This integration provides a strong theoretical backdrop to the present study by examining how self-paced readiness influences students' motivation and focus during the COVID-19 pandemic.

Conceptual Framework

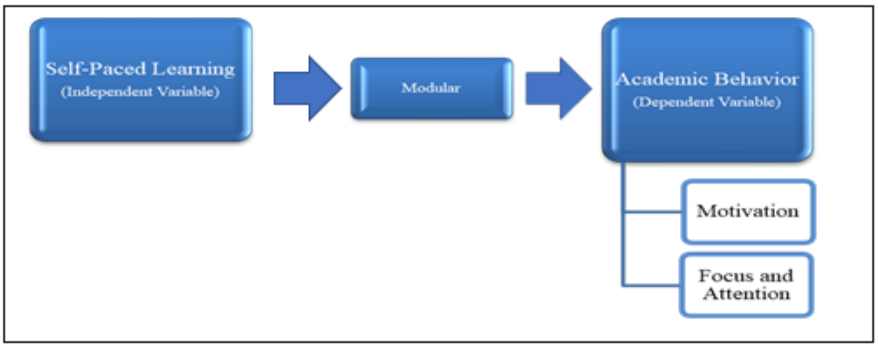

Figure 1: Conceptual Framework

Methodology

Research Design

The research utilized a descriptive-correlational type of study, which is appropriate in determining the relationship between self-paced learning readiness and the academic behavior of

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students in General Mathematics. The designs identify the present state, describe how a study is to be conducted, and how much is done without intervention (Creswell, 2012). It was selected as in the current study, we were not trying to prove causation but simply to assess whether there are strong associations between students' readiness for self-paced learning and their motivation, focus, and attention. Albeit not capable of demonstrating causal relations, correlational designs present useful patterns of association. In order to overcome this, some findings are cautiously interpreted and supported by theoretical and empirical literature available in other sources.

Research Respondents

Participants of the study included 203 Grade 11 students randomly selected from a student population of 425 attending Tangub City National High School, Misamis Occidental. The respondents were selected using a simple random sampling to guarantee that every student has an equal probability of being enrolled in the study and to make a representative sample.

Research Instrument

Structured questionnaires were employed in two formats:

Level of Students' Readiness in Self-Paced Learning (modified from Agherdien, 2014; Dray et al., 2011) — with students' confidence, self-regulation, independence, and mathematics competencies were measured using ten items.

The questionnaire had undergone validation through the research adviser and the Mathematics Teacher of the School of Teacher Education.

This study utilized the four-point Likert scale:

Responses	Continuum	Interpretation
4 – Advanced	3.25 – 4.00	Advanced
3 – Proficient	2.50 – 3.24	Proficient
2 – Developing	1.75 – 2.49	Developing
1 – Beginning	1.00 – 1.74	Beginning

Students' Academic Behavior in General Mathematics (based on Agarin, 2021; Agherdien, 2014; Schepers, 2007) — comprising two constructs: motivation (10 statements) and focus and attention (10 statements).

The questionnaire had undergone validation through the research adviser and Mathematics teachers of the School of Teacher Education.

Responses	Continuum	Interpretation
4 – Strongly Agree	3.25 – 4.00	Very High
3 – Agree	2.50 – 3.24	High
2 – Disagree	1.75 – 2.49	Low
1 – Strongly Disagree	1.00 – 1.74	Very Low

A 4-point Likert scale without a middle neutral value was used in both instruments to provoke clear answers. An adviser scientist, and a teacher of mathematics have to be consulted for content validity. Pilot testing with 30 students not in the main sample helped to improve on wording and understanding. Cronbach's alpha was calculated for the reliability analysis, resulting in satisfactory internal consistency coefficients (α =. 81 for readiness, α =. 85 for motivation, and α =. 83 for focus and attention), suggesting that the scales were reliable given the extant context.

Data Gathering Procedure

Data collection approval had been obtained from the School Division Superintendent and the Head of Tangub City National High School. Upon approval, the questionnaires were handed out to students during module retrieval hours, abiding by COVID-19 regulations. Respondents were recruited voluntarily and informed about their opportunity to withdraw from participation at any time.

Ethical Considerations

The ethical standards specified by the generic research ethics were followed in this research. The respondents were informed of all the measures that were taken in this research as a result of this. The respondents were treated with extreme importance and respect by the researchers. Voluntary engagement of the subjects was important to the study's efficient progress, and it was the researchers' top goal. Furthermore, the participants had the option to withdraw from the study at any time if they so

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desired. The respondents' privacy and anonymity were also emphasized by the researchers as being of the utmost importance. Finally, the researchers stated that the information acquired will only be used for research and academic purposes (Balan et al., 2021).

Data Analysis

The level of readiness and academic behaviors (motivation/focus) were described by mean and standard deviation. Significance and strength of relationships between readiness and academic behavior were evaluated using the Pearson Product-Moment Correlation Coefficient. This approach was selected based on the fact that both outcomes were measured on continuous scales.

Result and Discussion

Level of Students' Readiness in Self-Paced Learning during the COVID-19 Pandemic

The modular approach to the teaching and learning of mathematics has been highly successful as a tool in assisting students to learn mathematics. The modular system was described as a complete unit containing a single topic. Authorities have been split into self-contained packages which enable the student set his own objectives, select his sources and methods of learning at caret out select his sources and methods of learning to perform responsibilities (Charles & Rajasekar 2018). This offered more flexibility to both the method of distance teaching and the students. It gives learners independence and encourages them to take responsibility for themselves. Some studies also revealed that students preferred to learn from courses containing both modules and lectures in taking mathematics learning units (Padmapriya, 2015). After that, the modular system of teaching and learning in mathematics has been proven as an effective and efficient way when involving students in the learning process of mathematics (Charles & Sasikumar, 2018).

The respondents are capable of undertaking the tasks relevant to their modules, as displayed by the highest mean score of 2.78, indicated in Table 1, which means that they can arrange, organize, and complete activities on their own time. Moreover, a self-directed learner is generally more active in seeking information, planning, and evaluating their learning activities, which promotes higher motivation and academic performance (Freeman, Anderman, and Jensen 2007; Yilmaz 2016). Though the lowest mean score of 2.31 indicates that students are not yet confident about their proficiency in Mathematics and Formula Application, and Abstract Concept Understanding on their own, really. Insufficient background and poorly prepared teaching materials also hamper understanding (Nursolekah 2019). In general, the mean of 2.54 indicates that despite the disruptions due to COVID-19, students are independent enough to complete mathematical assignments, which reinforces the notion that self-regulated learning improves performance (Tullis et al., 2011).

This suggests Piaget's Cognitive Learning Theory, where learning involves new strategies (assimilation) and knowledge structures (accommodation) (McLeod, 2020; Reis, 2016). Students are learning how to cope with time management and task completion, but they're still trying to actually fit abstract math concepts into their models of learning. It is this gap that accounts for the high levels of readiness reported in terms of behaviors but low levels when it comes to targeted confidence.

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Table 1

Level of Student's Readiness in Self-Paced Learning during Covid-19 Pandemic

Statement	Mean	Interpretation
1. Confident in my ability to excel in my studies despite the COVID-19 pandemic outbreak.	2.31	Developing
2. Don't give up easily when confronted with mathematical-related problems.	2.53	Proficient
3. Comfortable studying in an alternative learning environment.	2.66	Proficient
4. Can complete my module tasks independently.	2.78	Proficient
5. Can organize my time and keep myself on track to complete the module's tasks in a timely manner.	2.65	Proficient
6. Can regulate and adjust my behavior to complete the modular activities on time.	2.65	Proficient
7. Can understand the main concepts of General Mathematics and its importance without guidance from the teacher.	2.49	Developing
8. Can direct my learning progress while learning through modules.	2.53	Proficient
9. Numerical concepts are not a problem for me.	2.44	Developing
10. Possess with necessary mathematical skills required to complete my studies.	2.39	Developing
Overall Mean	**2.54**	**Proficient**

Notes: 1.00 – 1.74 – Beginning; 1.75 – 2.49 – Developing; 2.50 – 3.24 – Proficient; 3.25 – 3.99 – Advanced

Student's Academic Behavior

Academic behaviors are those that are directly or indirectly related to a student's success in school (e.g., time-on-task behavior, attendance, self-control, motivation) (Erwin et al., 2012; Rasberry et al., 2011; Reed et al., 2010). Under the term academic behavior, we use the synonyms adaptive skills, key skills, behavior cusps, suitable replacement behaviors, executive functioning abilities (Dixon et al, 2014), learning readiness skills (Kamps et al., 2002), ready-to-learn skills (Davis et al., 1989; McIntosh and Ellison-Potkoinder-Arjuan, in press), pro-social behavior skills (Simonsen et al., 2010), and Positive Behavior Support skills. These labels can be used interchangeably when discussing the knowledge and aptitudes that students require to learn lessons and be involved in curricular activities within a daily classroom (Crump, 2015).

Motivation

Motivation is a key to successful academic learning. It's important and valuable because it has implications – motivation leads to results. Motivation is defined by the mental processes that generate intention in a person to do something. Physical and psychological energized action is needed in motivation (Gerstner, 2017). Physical exercise requires effort, persistence, and other observable actions. Mental activity such as planning, rehearsing, organizing, monitoring, making decisions, and problem solving are examples of (Schunk et al., 2014).

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Table 2

Student's Academic Behavior in Terms of Motivation

Statement	Mean	Interpretation
1. I am interested to learn more and know more.	3.38	Strongly Agree
2. I have a good study strategy and high study effort.	2.91	Agree
3. I am highly motivated to learn the topics presented in the modules.	2.81	Agree
4. I am persistent to pursue learning even when faced with obstacles during this pandemic.	2.95	Agree
5. I have the drive to reach my learning goals.	2.96	Agree
6. I have clear goals for my studies for this academic year.	2.99	Agree
7. I know what study method works for me.	2.83	Agree
8. I am self-motivated.	2.91	Agree
9. I believe that I am responsible for my studies.	3.03	Agree
10. Getting good grades is important to me.	3.15	Agree
Overall Mean	**2.99**	**Agree**

Notes: 1.00 – 1.74 –Very Low; 1.75 – 2.49 – Low; 2.50 – 3.24 – High; 3.25 – 3.99 – Very High

The high mean value of 3.38, as shown in Table 2, also implies that the students strongly agreed that they are motivated to learn more, which means that despite the pandemic, they were still optimistic about improving their studies (Rahiem,2020). The lowest mean of 2.81 signifies that learners are motivated to comprehend modular topics, but they still find it difficult to apply efficient strategies. However, exposure to different teaching methods increased flexibility (Bhagat et al., 2015). Students remain motivated and persistent despite obstacles, completing work and maintaining grades on the whole (Rahiem, 2020).

Responsibility and a set of academic goals were also important to students, and high grades were reported as crucial to achievement. This is indicative of their awareness of learning responsibilities (Demir, 2015) and the function of goal-setting in identifying personal needs and academic aims (Mayse, 2016). In general, the overall mean of 2.99 (Agree) indicates that motivation plays a significant role towards success in modular learning, which is in line with the perception that performance closely reflects motivation (Schunk et al., 2014).

Viewed through the lens of Self-Determination Theory (Deci & Ryan, 1985), this may imply that autonomy experienced in modular learning leads to intrinsic motivation, but an indication is provided for lack of competence support as lower scores on topic-specific motivation. Independence alone does not do the trick — students require guidance to feel capable of understanding material. This perhaps explains why motivation is strong in general learning attitudes and less so with respect to Mathematics.

Focus and Attention

Attention reflects the mental awareness or focus (Cicekci et al., 2019), and it allows learners to react adequately to their environmental stimuli. Curiosity is important to drive attention (Moran, 2017), so his interest needs to be elicited in order for learners to focus on the presented material (Dao et al., 2016).

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Table 3.

Student's Academic Behavior in Terms of Focus and Attention

Statement	Mean	Interpretation
1. I can resist doing something when I know I shouldn't do it.	2.67	Agree
2. I can calm myself down when I am excited or upset.	2.83	Agree
3. I finish whatever I began.	2.93	Agree
4. Setbacks don't discourage me.	2.89	Agree
5. I can study over a long period.	2.85	Agree
6. I can study and understand what I read despite the presence of other distracting stimuli.	2.80	Agree
7. I am good at staying focused on my goal.	3.05	Agree
8. I can return my full attention to studying after a short interruption.	2.86	Agree
9. I can do calculations despite people moving around me.	2.62	Agree
10. I can still focus even without silence.	2.66	Agree
Overall Mean	**2.82**	Agree

Notes: 1.00 – 1.74 –Very Low; 1.75 – 2.49 – Low; 2.50 – 3.24 – High; 3.25 – 3.99 – Very High

The highest mean score ever received was 3.05 in Table 3, which shows that students agree on the fact that they are successful at staying focused on their goals and showing persistence when performing tasks despite difficulties. Strategic learners can establish feasible goals for themselves by evaluating their performance and context, and exercise diligence, creativity, and persistence under difficult circumstances (Weinstein et al., 2003). These students can soothe themselves when annoyed, resist distractions, and sustain longer spans of concentration on their studies. They take charge of their learning in that they are consciously aware when they know and do not know about new topics, asking for help from the teachers or friends.

The average of 2.82 (Agree) indicates that students are generally able to stay focused and attentive in modular learning. This is in line with Prakash (2015), who discussed that focal attention enables learners to filter the relevant information, has a capacity to hold information within awareness, and avoids unnecessary distractions, leading to effective learning.

Viewed from a behaviorist perspective (Picciano, 2017), this can be attributed to patterns of reinforcement. Learners become habituated to returning even after leaving and paying attention, but there are outside influences that can disturb relearned habits. This also concurs with the general view that attention is a process modulated both endogenously and exogenously (Cicekci et al., 2019).

Significant Relationship between the Level of Students' Readiness for Self-Paced Learning and Students' Academic Behavior

The test statistic, Pearson Product–Moment Correlation Coefficient, assesses the statistical link, or association, between two continuous variables. Because it is based on the method of covariance, it is known as the best method for quantifying the relationship between variables of interest.

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Table 4

Significant Relationship between the Level of Readiness on Self-Paced Learning and Student's Academic Behavior

Variables	r-value	p-value	Remarks
Readiness and Motivation	0.452	0.00	Highly Significant
Readiness and Focus and Attention	0.529	0.00	Highly Significant

Notes: If p-value > 0.05 – Not Significant; if p-value ≤ 0.05 – Significant; and if p value ≤ 0.01 – Highly Significant

Correlation Size: .00 - .30 – Negligible; .31 - .50 – Low; .51 - .70 – Moderate; .71 - .90 – High; and .91 – 1.0 – Very High

The findings indicate a very strong correlation between the students' readiness in learning on their pace and motivation (p=0.0000, α = 0.05). But 0.452 of Pearson's correlation value shows a low level of significant positive correlation, which apparently means students are prepared to solve modular activities, but they may not necessarily be motivated enough for the completion of the activity. In flexible, self-paced environments, intrinsic motivation is important to establish as goal content and guidance (Shirk, 2020).

Similarly, the preparedness was very significantly correlated with focus (p = 0.0000, α = 0.05), and it was moderately positively associated with each other variable (r=0.529). That means, students overall are generally paying attention to their studies even when away from challenges. Similar to Hariyanto (2021), students who maintain attention will be able to participate effectively in learning activities and finish the activities successfully.

This is consistent with Self-Determination Theory, in which autonomy increases motivation (Deci & Ryan, 1985). It is also closely related to Piaget's theory of adaptation, in that those successful adapters to modular learning requirements were more motivated and focused students. In terms of behaviorism, multiple reinforcements for successful task performance would strengthen concentration, and it may lead to the positive relationship reported here.

Implications of the Findings

These results emphasize the necessity of offering not just autonomy, but also competence support in modular self-paced settings. Educators need to create differentiated materials that help students build the structure for difficult math concepts in a way that promotes independence. Parents, meanwhile, are critical to keeping progress on track and distractions to a minimum within the home. Policy leaders could employ the knowledge gleaned from these findings to develop flexible learning pathways that include behavior observation, differentiated instruction, and cognitive load management into teacher training programs and curricular design.

Limitations of the Findings

The study is not without limitations, however. The descriptive-correlational design precludes causal arguments; readiness could impact motivation and focus, but motivation can play a role in readiness. All information is self-reported and thus may be subjected to social desirability bias if students overreport positive behaviors. Lastly, it was carried out with 11th-grade students in a single public school, so the conclusions cannot be extended to other grade levels or contexts. It is recommended that future efforts build the sample across schools and consider employing mixed methods or longitudinal designs to yield a more comprehensive understanding of how self-paced instruction impacts academic behavior over time.

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Knowledge Contribution

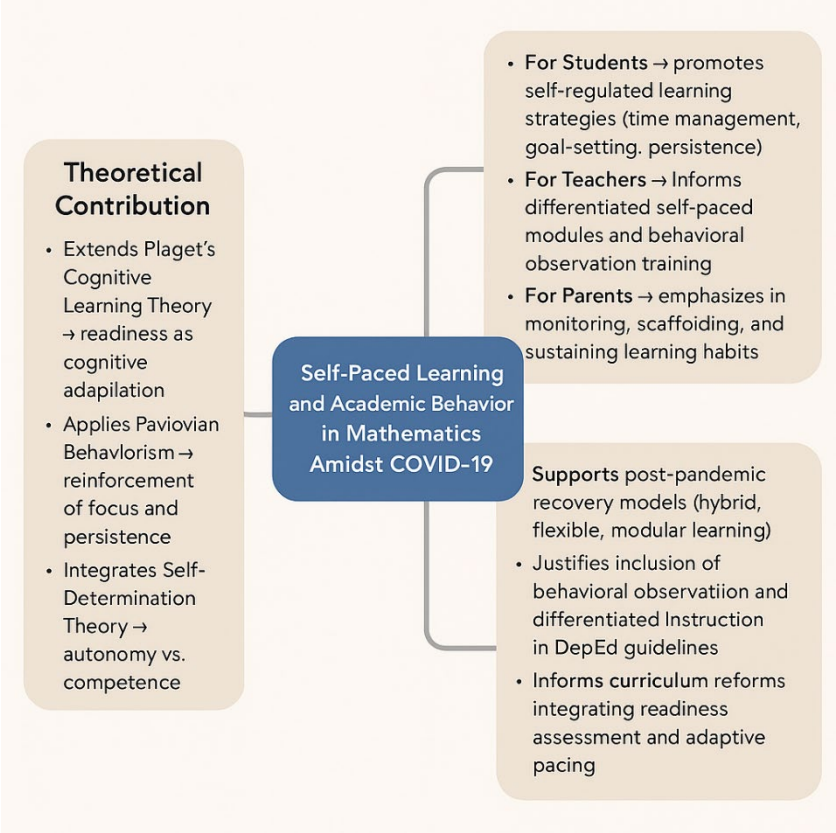

Figure 2: Knowledge Contribution

The work contributes new knowledge at three interrelated dimensions of theory, practice, and policy. Theoretically, it contributes to educational research by integrating cognitive (Piaget), behavioral (Pavlov), and motivational (SDT) theories into a unified system that has been shown to explain the impact of readiness on motivation and focus in Mathematics. This integration represents an original input for it reveals that students' high motivation but low confidence can be explained by deficiencies in competence support.

In practice, the results suggest concrete things students, teachers, and parents can do. Students are motivated to be self-regulated learners; teachers are directed in constructing personalized units of instruction and in watching academic behaviors more purposefully, and parents mobilize as supporters of study behaviors. These concrete contributions directly fill the gaps the modular camp system revealed during COVID-19.

Policy-wise, the study advocates for continued efforts towards flexible learning within and outside the Philippines. Its results are evidence for building differentiated self-paced learning paths, training behavioral observation, and post-crisis hybrid learning in the official curriculum guidelines. This way, the research makes sure that modular learning is not only a short-term crisis response but rather constitutes a substantive element of an alternative.

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Conclusion

The present research examined the interest of Grade 11 students in General Mathematics toward self-paced learning and its correlation to academic behavior in the COVID-19 situation. Findings indicate that students are comfortable with readiness tasks (M=2.54), demonstrating independence and mastery, yet developing confidence in menial mathematics calculation is demonstrated (M=2.31). Students also reported high motivation (M = 2.99) and focus and attention (M = 2.82), with correlation analysis revealing significant positive relationships between readiness and motivation (r =. 452, p <. 01) and between readiness and attention (r =. 529, p <. 01).

The main conclusion from the review is that when self-paced learning is provided, motivation and attention in students can be enhanced through the provision of autonomy however, challenges are raised when self-paced learning does not allow for competence to be supported sufficiently in subject-specific areas such as mathematics. Piagetian theory describes how students respond cognitively to open environments, while Pavlovian Behaviorism emphasizes the conditioning of perseverance via repeated modules. Self-Determination Theory (Deci & Ryan, 1985) explains that autonomy is the driver of engagement while competence breeds confidence. Therefore, if motivation and attention are stimulated by modular self-paced learning, the possible downside is a greater spread of lack of confidence in mathematics unless teaching strategies and support structures are improved.

Recommendations

For Educators

- Offer teacher training in creating and running self-paced modules that balance autonomy against scaffolding.
- Create formative assessments and feedback tools for modular learning for students to track their progress and gain self-confidence in Mathematics.
- Use CLM (e.g., chunk lessons; provide guided examples) to organise the learning, managing what students hold in their heads at any one time.

For Parents

- Become a participant in your children's education through creating study schedules and removing potential distractions.
- Reward small steps in modular work to build staff members' persistence and resiliency.

For Policymakers and School Leaders

- Embed flexible and hybrid learning models that bring together the best of self-paced independence and teacher direction.
- Advocate for policies that mandate readiness audits before program-wide implementation of self-paced learning, so students can be supported differently according to need.
- Support and sponsor some training courses for teachers on self-paced teaching methods, behavioral observation, and motivational skills to improve classroom practice.

For Future Researchers

- Examine causal relationships by longitudinal or experimental design.
- Replicate in several schools and at multiple grade levels to examine generalizability.
- Investigate other dimensions such as digital tools, peer mutualism, and socio-emotional support to deepen understanding of the effects of self-paced learning.

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