

Implications for Peaceful Learning of the Learning Preferences of Mathematics major Students

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ABSTRACT

This study sought to explore the preferred learning preferences, challenges, and coping strategies of the fourth-year Bachelor of Secondary Education (BSEd) major in Mathematics at Cotabato State University. This study employed a qualitative phenomenological research design. The research included five (5) fourth-year mathematics major students who experienced both a pandemic and a post-pandemic learning environment. Data were collected using a semi-structured interview guide. Thematic analysis revealed three dominant learning preferences: collaborative learning, visual and synchronous instruction, and self-directed learning. Despite these preferences, students faced a number of challenges, such as limited opportunities for peer interaction, technological barriers that affected learning access and participation, and difficulty transitioning. Participants used video resources for step-by-step problem-solving and self-verification, digital learning resources involving visual reinforcement, and active and self-regulated learning to cope with these challenges. The findings indicate that students demonstrate adaptive learning by integrating collaborative and independent learning with the help of digital resources. The paper highlights the need to create adaptive and adjustable teaching methods that would meet the needs of various learning preferences and encourage interaction within the post-pandemic educational context.

Keywords: *Learning preferences, Peaceful learning, Mathematics education, Philippines.*

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INTRODUCTION

COVID-19 changed the normal forms of teaching and learning in the world, making the education systems in the world shift to flexible and technology-mediated systems of teaching and learning at an accelerated pace. Global reports by the UNESCO (2021) and World Bank (2021) show that there are widespread learning losses, reduced student interactions, and increased threats to academic and emotional student welfare. Empirical studies also indicate that a high percentage of students reported to have increased anxiety levels, inability to focus, and lack of motivation in remote learning, and a significant number of students reported to have mental health issues related to isolation and disruption of their academic learning (Son et al., 2020; Aristovnik et al., 2020). These results highlight the significant consequences of the pandemic on cognitive and affective aspects of learning.

There have been reports about the same issues in the Philippine setting. According to reports from the Department of Education and the Commission on Higher Education, educational disparities became worsened by unequal access to digital devices, internet connectivity, and educational resources. These differences are highly experienced by students with a low socioeconomic status, those pursuing online education, and those who continue their schooling. Besides causing unequal learning outcomes, these differences have also complicated the process of ensuring quality education to students in the course of and after the pandemic.

These disturbances are especially significant in mathematics education, where long-term engagement, conceptual knowledge, and interactive problem-solving are crucial. The study of Coman et al., (2020) and Dhawan (2020) reveals that students had to encounter great challenges in learning mathematics in an online and blended learning setting, which involves less immediate feedback, less peer learning, and difficulty in understanding abstract concepts. The fact that many learners are struggling to keep up their performance and interest in mathematics lessons as a result is testament to the fact that a more comprehensive understanding of how students may change their learning styles under such circumstances is in demand.

Recent studies have shown that post-pandemic education has seen the development of changes in the learning preferences of students since the hybrid and flexible learning environments introduced additional changes. Research indicates that peer interaction, engagement, and academic involvement remain solidified through collaborative learning, particularly in blended learning environments where students will navigate through the physical and virtual worlds (Khristin Fabian et al., 2024). At the same time, the role of visual and self-directed learning strategies has been increasing in importance in promoting the independent learning of students, their flexibility, and conceptual learning in mathematics (Sani Alhaji Garba and Lawan Abdulhamid, 2024). These results indicate that the learning preferences are dynamic and adaptive, influenced by the technological integration, the shift towards the learning modality, and the new demands of post-pandemic education (Nathan Mentzer et al., 2024).

Learning preferences, or how people like to learn and process information, is a contributing factor to how students learn. Despite the fact that the previous literature has been very broad in its approach to the concepts of learning preferences, the recent studies introduce an idea that the concept is still controversial, with little empirical evidence to support the strict categorization of the learners (Pashler et al., 2008). Thus, this study is more open in its approach to learning preferences as adaptive tendencies as opposed to fixed categories. This perspective has been informed by several theoretical perspectives: the Dunn and Dunn model has been used to explain the effects of environmental and instructional conditions on learning; the constructivist theory has been used to explain how learners construct knowledge through experience; and the experiential learning model developed by Honey and Mumford (1986) highlights the importance of experience-based learning.



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The proposed study is informed mainly by the social constructivist theory which perceives learning as a socially mediated process (Vygotsky, 1978). It is filled with the concept that the learning preferences are dynamic inclinations, yet not discrete groups.

The circumstances that defined learning during and after the pandemic encompassed online learning, decreased face-to-face interaction, and increased use of technology, which resulted in changes in students' learning preferences. Students were more drawn to online resources, autonomous learning, and self-regulated learning (Dhawan, 2020; Coman et al., 2020; OECD, 2021). These adjustments are not only academic in nature but are deeply associated with students' emotional well-being, sense of comfort, and the feeling of not fully belonging in the learning environment.

In this respect, the issue of how to build up a peaceful learning environment, one that would contribute to emotional stability, stress reduction, and meaningful interaction, has become a growing concern (Jennings and Greenberg, 2009).

Despite the studies that have been conducted on learning preferences and the outcomes of learning online, there has been a little research on the lived experience of mathematics major students, especially in developing countries like the Philippines, and how their preferences in learning are linked with the creation of a peaceful learning environment in the post-pandemic period. Most of the studies carried out in the past are grounded on quantitative rather than qualitative aspects of the performance of students, their coping mechanisms, and their feeling towards learning.

To fill this gap, the study will aim at answering the question of what students majoring in mathematics prefer to learn about and how this is related to peaceful learning. In particular, it will seek to explain dominant learning preferences, explore the barriers that students face in the post-pandemic environment, and discuss the effects on learning preferences on the ability of students to achieve a balanced, supportive, and conducive learning environment. This research will likely offer some insights to teachers on how to develop inclusive, adaptive, and peaceful learning models that support the academic success and well-being of students.

Research Questions

1. How do the math major students describe their learning preferences?
2. What challenges do they experience in using their learning preferences?
3. How do they cope with such challenges?

Theoretical Lens

This study is founded on the Dunn and Dunn Learning Style Model, which was formulated by Rita Dunn and Kenneth Dunn in the early 1970s and further developed in later works (Dunn & Dunn, 1993). This model describes how different factors, which include environmental, emotional, sociological, physiological, and psychological factors, affect how learners process and maintain information. The model in this study provides acceptance to the idea that students majoring in mathematics showed a number of learning preferences, which include autonomous, collaborative, and visual learning. When appropriately addressed, these preferences shape how students engage in class and help establish a more comfortable and relaxed learning environment.

Another basis for this study is Constructivist Learning Theory (Piaget, 1970; Vygotsky, 1978), which is primarily associated with Jean Piaget and Lev Vygotsky. According to this theory, learning is an active process in which individuals develop knowledge through interaction, experience, and insight. Constructivism is employed in this study to explain how learners learn mathematics through solving problems, collaborating, and engaging in classes. In addition to that, it also highlights the importance of interaction and active participation in maintaining a peaceful and supportive learning environment.



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Study Design

This study employed a qualitative phenomenological research design to explore the learning preferences, challenges, and coping strategies of math major students. Qualitative methods are different in the sense that they allow the researcher to deeply investigate the issue in question. They are able to capture various perspectives, ideas, explanations, and arguments provided by the respondents or small groups (Butina, 2015). As stated by Creswell (2013), a phenomenological study explores the common significance of a concept or phenomenon as experienced by various individuals. In-depth, semi-structured interviews were done either in person or online via Messenger depending on the participants' availability to gather the data. According to Chang and Wang (2021), interviews are the most appropriate and standard methods of inquiry for phenomenology, which requires both written and verbal expression of situations concerning the past, present, and future to be able to facilitate understanding of shared experiences.

The researchers utilized a standard semi-structured interview guide to conduct the interviews in order to ensure consistency in data collection. Four (4) of the five interviews were done in person, while one (1) was done online via Messenger depending on the participants' availability. Each interview lasted approximately 30-40 minutes, with an average duration of 36 minutes. Participants had the opportunity to express their experiences using both modes, although the online interview offered more flexibility while the in-person interview allowed for deeper interaction and nonverbal cues. To ensure data comparability, however, consistent procedures were applied for each interview.

Population and Sample

The respondents of the study were students studying in the BSEd Mathematics program in the 2025-2026 academic year. A total of five (5) students took part in the study. The sample was selected under particular inclusion criteria: (1) are currently enrolled in the fourth year of BSEd mathematics courses; (2) have been exposed to online and blended learning; and (3) are willing to take part in the study.

In order to give a contextual background regarding the findings, basic demographic features of the participants were taken into consideration. The participants' ages ranged from approximately 22 to 25 years old. The participants consisted of two (2) male and three (3) female students.

Data collection was limited to data saturation, where there were no new insights from the participants. Saturation was reached after five interviews, as the same themes and responses emerged from the participants. This ensured that the data gathered were enough to comprehensively understand the participants' learning experiences and preferences.

According to Crouch & McKenzie (2006), the researcher would find it easier to establish and maintain a close relationship with fewer than twenty respondents, which would enhance the transparent and courteous sharing of information. Therefore, the ideal sample size for phenomenological studies is between 4 and 10 interviews (Smith et al., 2009, as quoted by Patiño, 2025).

Purposive sampling is a sampling technique utilized in this study. Purposive sampling is frequently used in studies where the researcher seeks to focus on a particular group that has characteristics related to the study's aim (Etikan, Musa, and Alkassim, 2016). This method improved credibility. Dependability and trustworthiness since it made it possible to gather data from respondents who are in an ideal position to contribute their learning styles and post-pandemic academic experiences.

Instrumentation



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Data were collected using a semi-structured interview guide to explore the math major students' learning preferences and experiences without specifically mentioning or stating any learning styles. The three research questions are included in the interview guide. To ensure the content validity, the instrument was tested by mathematicians. To strengthen the questions' relevance and clarity, a pilot test was conducted. The researchers presented a picture scenario with guided questions that were commonly experienced by the respondents. Without specifically addressing or indicating any learning styles, these scenarios were carefully planned to generate authentic responses, allowing respondents to freely share their preferred learning approaches. In a semi-structured interview guide, the researcher had the chance to ask pre-planned questions, and also respondents were free to share their thoughts, which provides both flexibility and structure (Creswell, 2014). Respondents were provided realistic learning scenarios that are often seen in the educational setting as part of the scenario-based approach. This makes scenario-based instruments typically more time-consuming to score than self-report scales but could be better at evaluating the potential behaviors of participants in realistic situations (McKenna, 2007).

The interview guide was designed with picture-scenario prompts, which would help to have more reflective responses and richer answers by the participants. These picture-scenarios were typical learning conditions in mathematics education, such as peer collaboration, independent study, and technology-assisted learning. These questions were used as a guide to enable the participants to describe their experiences, likes, and difficulties in learning mathematics. Appendix A contains the entire picture scenario employed during the interview.

Data Analysis

Thematic analysis was employed in analyzing the data obtained in the interview based on the methods of Colaizzi (1978) and Giorgi (2009). The analysis of the interview situations was performed independently to allow correct interpretation of the responses of the participants.

First, all the interviews recorded (recording audio and taking notes) were transcribed word-to-word. Each of the transcripts was read by the researchers a number of times in order to be acquainted with the data and to get a thorough understanding of the answers of the participants in each situation.

Second, significant statements concerning the learning styles and experiences of the mathematics major students in the post-pandemic environment were selected and pulled out. Meanings were then derived out of such statements.

Third, similar meanings in various situations were lumped together and dumped into groups. These groups were further grouped to come up with emerging themes that were a reflection of shared patterns and experiences amongst the respondents. The themes were discussed and narrowed down to make them clear, coherent and relevant to the research objectives.

After this, the themes were then interpreted and synthesized to give the overall learning experience of students in post-pandemic contexts, with the help of verbatim responses of the participants.

Ethical Consideration

The research conformed to the ethical principle of qualitative research in the education field. Before collecting the data, Institutional Review Board (IRB) or Research Ethics Committee approval had been obtained. Prior to data collection, all the participants were provided with an informed consent document detailing the purpose of the study, the approach used in conducting the interviews, voluntary participation, their right to quit at any moment without any ramifications, potential risks, and the measures taken to ensure confidentiality. Participants were also informed of their right to refuse to answer any question or discontinue the interview at any stage without any negative consequences.

To protect participants' identities, we kept them anonymous by using pseudonyms (e.g., P1, P2). Digital audio, transcript, and field note files were stored securely in a password-protected and locked computer file that was



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accessible only to the researchers. These data will be kept for five (5) years and will then be destroyed thereafter. Furthermore, they were given the contact details of the university counseling office in case they needed additional psychological support. To prevent any potential ethical issues arising from power differentials, considering that the participants were students in the same university as the researchers, recruitment was conducted by an independent third party who was not the participants' instructor, examiner, or supervisor.

Data collection and recruitment of the participants were conducted outside the classroom and recruitment was done. place had to follow the submission of all final grades. This was to make sure that there was no association between. involvement and school performance, reputation or student to teacher relationship hence reducing any. perceived coercion.

All the data utilized were de-identified, and the quotations of all the participants were thoroughly screened to avoid. revealing any information that can identify them. The principles of autonomy, beneficence, confidentiality, and justice were strictly upheld throughout the study.

RESULTS

Mathematics major Students' Descriptions of their Preferences

The fourth-year BSED-Math students' descriptions of their learning preferences are presented in Table 1.

Table 1. Mathematics major Students' Descriptions of their Learning Preferences

| Themes | Subthemes | Representative Quotes |
|---|--|---|
| Preferences for collaborative learning | Peer interaction | <i>"I'd rather work with many people than work on my own because sometimes I myself do not know everything."</i> (P4) |
| Preference for Visual and Synchronous Instruction | Need for real-time demonstration | <i>"I prefer to see my teacher in, like, Google Meet or Zoom, since I do not like a class or learning where I cannot see the teacher."</i> (P1) |
| Self-Directed Learning | Autonomous Motivation | <i>"I'm more comfortable learning alone, and that's enough motivation for me to do that because I can focus more when I am studying alone than with peers."</i> (P1 & P2) |
| | Focused learning and minimization of distraction | <i>"Studying alone llows me to focus and, at the same time, have fewer distractions."</i> (P3 & P4) |

Table 1 presents the learning preferences of the fourth-year BSED-Mathematics students as collaborative learning, visual-synchronous learning, and self-directed learning. Although these themes are given in isolation to provide clarity, the responses of the participants reveal that learning preferences. are not rigid classifications but are adaptable and often interconnected.



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The results depict the preferences of the participants towards collaborative learning. Participants indicated that they might be able to think better together to get the subjects clearer, not necessarily just their own. understanding. Learning is perceived as a co-operative process whereby knowledge is generated through peer. communication and exchange of ideas. This tendency among the participants shows their awareness of the limits of individual understanding and the value of collective reasoning. Through peer interaction, the participant is provided with cognitive support to exchange, clarify and verify ideas. Such preference augments learning by dialogue and collaborative problem solving as opposed to restricting it to. individual study.

Also, the participants indicated that they also preferred visual and synchronous instruction. It is the how to watch the teacher presentation, and to see the solution process in real-time, which can be improved. the knowledge of mathematical ideas. Learning for participants is not only listening to explanations as well as observing the process of solving problems step-by-step. The visual guidance increases the fact that participants will be guided by the flow of the lesson. This preference means that the comprehension of mathematics has to do with a perception of how the concepts are applied and exhibited in comparison to verbal explanations. They can hardly comprehend the without visual and synchronous teaching. process, which restricts their following ability of the lesson.

Additionally, other respondents also mentioned that they prefer to learn independently, where they have the ability to control their learning environment, speed, and concentration. They say that with independence they can better focus and get involved with the material, without distraction. This preference, based on participants' efforts to understand and apply concepts, shows a sense of ownership of the learning process. They are driven to do their work alone and grow on their own instead of depending on others. The participant statements indicate that independent study is associated with comfort, motivation, and better concentration. They said studying alone allows them to concentrate on areas they need to work on and avoid distractions.

The findings suggest that although the three learning preference themes are presented separately, participants do not only rely on a single preference in the same way. Participant 4 expressed the value of collaborative learning, but most of the participants, especially Participants 2, 3, and 5, preferred self-directed learning. However, Participant 1 showed both visual-synchronous and self-directed preferences, thereby providing evidence that a single learner may have multiple styles.

The findings of this study indicate that learning preferences are not necessarily the same but vary between participants. It compensates for the lack of disconfirming cases by including participants who relied mainly on one preference as well as those who combined preferences and provides evidence of differences.

If multiple preferences are identified, this does not mean that there is a conflict; rather, it indicates how participants navigate trade-offs. For instance, in practice and reinforcement, self-directed learning is applied, and in understanding complex topics, visual-synchronous learning can be used. This suggests that learning preferences are used flexibly as a function of task and level of difficulty rather than as fixed or mutually inconsistent.

Challenges of the Mathematics major Students in using their Learning Preferences.

The fourth-year BSEd-Math students' challenges in using their learning preferences are presented in Table 2.



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Table 2. Challenges of the Mathematics major Students in using their Learning Preferences.

| Themes | Subthemes | Representative Quotes |
|--|--|--|
| Limited opportunities for peer interaction | Lack of collaboration | <i>"There's limited interaction with classmates, friends, and also with a teacher."</i> (P5) |
| | Difficulty asking questions | <i>"In a way that you want to ask some, you want to ask, but you cannot ask."</i> (P3) |
| Technological barriers affecting learning access and participation | Poor internet connectivity | <i>"I experience poor internet connectivity, or in some cases, other participants may have unstable connections."</i> (P4) |
| | Lack of devices | <i>"When you don't have devices since not everyone can afford devices."</i> (P2) |
| Difficulty in transitioning | Adjustment from independent learning to collaborative learning | <i>"I was used to studying on my own, making it the most difficult adjustment for me now that we need to interact and learn with others again."</i> (P1) |

Table 2 presents the challenges experienced by the participants in using their learning preferences. The findings are categorized into three themes: limited opportunities for peer interaction, technological barriers, and difficulty in transitioning.

The findings reveal that one of the most common challenges that participants experienced is limited opportunities for peer interaction. As participants point out, their limited chances to interact and collaborate with peers are influential factors that determine their capacity to share ideas, ask questions, or gain an understanding of various complicated mathematical concepts. This limitation renders it hard to get the participants to fully grasp mathematical subjects, taking into account that mathematics tends to require explanation, discussion, and step-by-step solving of problems and that in learning mathematics, it is easier when the ideas are discussed and explained through interaction. Their experiences prove that the issues of collaboration are very important in terms of their interpretation of the lessons.

Other challenges that were found to be faced by the participants include the technological barriers that can influence the accessibility and participation of learning. They have cited issues like poor internet connectivity, and lack of devices, to engage in online or blended learning activities. These challenges illustrate how resources and technological problems can hinder the full involvement of the learners in the online learning process. The responses indicates that to facilitate learning, students must be able to have a stable internet connection as well as appropriate devices, especially in a digital or blended learning environment where technology is an important factor.

Furthermore, some participants are having difficulty in transitioning from independent learning to collaborative learning. The participants' responses demonstrate that their learning habits are being shaped through their exposure to independent study, making it challenging for them to interact and work together with others again. After a long period of independent learning, some students find it challenging to adopt adjustments that are required in



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communication, interaction, and collaboration. This change makes it clear that the adaptability of students is shaped by the experiences they have in learning, and based on the exposure to past learning, switching between independent and collaborative learning may be difficult.

All the participants did not experience the challenges equally as evident in the responses of the participants P1-P5.. Participants 3 and 5 described the lack of opportunities for peer interaction and collaborative problem-solving. Participants 2 and 4 were largely focused on technological barriers affecting access and participation, specifically unstable internet connection and lack of devices. Participant 1 described the difficulty of transitioning from independent learning to collaborative learning.

The findings indicate that while similar broad challenge themes emerged, there was some difference among participants in the challenge types most prominent in their experiences. Participants focused on specific difficulties depending on their learning conditions and access to resources.

Coping Strategies of Mathematics major Students with such Challenges

The fourth-year BSEd-Math students' coping strategies with such challenges are presented in Table 3.

Table 3. Coping Strategies of Mathematics major Students with such Challenges

| Themes | Subthemes | Representative Quotes |
|---|------------------------------------|--|
| Use of video resources | Step-by-step problem solving | <i>“Instructional videos help me the most, like YouTube, because they provide complete step-by-step solutions that help in understanding the process”</i> (P4) |
| | Self-verification of answer | <i>“When you encounter a problem you cannot solve, you can search for tutorials on YouTube, which is one of the advantages of digital learning.”</i> (P3) |
| Preference for Digital Learning Resources | Visual Reinforcement | <i>“I think it's more effective if there is a visual aid or visual presentation.”</i> (P1) |
| | Improved focus and engagement | <i>“I feel like if I can see my teacher, I am more focused, and also, like, if the teacher has a video presentation instead of just discussing it and no presentation.”</i> (P2) |
| Active and self-regulated learning | Actively listening and note-taking | <i>“I listen attentively to my teacher and also take notes.”</i> (P2) |
| | Practice and independent learning | <i>“The first thing I do is take notes while listening. And then practice solving problems.”</i> (P5) |

Table 3 presents the coping strategies of the participants in coping with the challenges they are facing in their learning process. The results are organized into three main themes: use of video resources, preference for digital



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visual resources, and active and self-regulated learning. The coping strategies are not applied randomly but directly in line with the given problems that the students face in learning math.

To a great extent, the use of video resources, especially the step-by-step problem solving and self-verification of the answers are used to solve the problem of limited instructional support and the inability to comprehend complex mathematical concepts. Students can review lessons, watch detailed explanations, and check their solutions on their own. This not only substitutes for the immediate help of teachers or classmates but also teaches students a way of self-learning. Moreover, this strategy reduces the effect of technological barriers, as video resources can be revisited repeatedly and asynchronously, allowing students to learn even if the internet connection is unstable or online class attendance is interrupted.

Similarly, the popularity of digital learning resources that reinforce visual learning is symptomatic of the problem of limited participation and understanding in verbal/textual-only learning. Visual deliverables and demonstrations help to materialize abstract mathematical concepts, which contributes to a better understanding and helps to keep students focused on the learning process. This shows that visual information is very helpful in assisting students who are having problems with more traditional and non-interactive ways of teaching.

Nevertheless, issues like lack of structure, distractions, and moving from independent learning to collaborative learning can be tackled by active and self-regulated learning strategies like note-taking, active listening, and practice. These approaches assist students to self-regulate their learning process and self-discipline and to stay engaged in academic activities in the face of less external guidance.

The coping strategies identified were not used by the participants in a uniform way. All participants reported using a combination of strategies, but there were differences in frequency of use and in context of use for each strategy. Participants 3 and 4 focused primarily on the use of video resources to solve problems step-by-step and to verify their own answers, while Participants 1 and 2 highlighted the importance of visual reinforcement through digital learning resources. Participants 2 and 5 cited active and self-managed learning approaches such as taking notes, listening attentively, and practicing independently.

These patterns imply that the practice of coping is not an individual practice but a flexibly applied combination of practices depending on the learning difficulty and circumstance. An example is that video and visual resources are applied frequently when an understanding of a concept is hard to achieve, whereas self-regulated approaches are used at all times during practice and independent study.

No coping strategy was used exclusively by any participant, but there is variation in emphasis and use. This suggests that students use adaptive, context-dependent strategies, rather than a fixed coping strategy. The overall similarity in strategies may be due to the participants' common academic environment, but differences in execution may reflect individual learning responses.

Discussion

This study explored the learning preferences, challenges, and strategies of math major students. The findings reveal that the participants of the study had preferences in collaborative, visual-synchronous learning, and self-directed learning. The preference to collaborate in learning is both indicative of the constructivist approach to learning and the sociological aspect of the Rita Dunn and Kenneth Dunn Learning Style Model, which states that learners can also prefer to learn individually, in pairs, with peers, or in groups. The fact that the participants preferred peer interaction also indicates that mathematical knowledge is built through social interaction and mentoring. The participants' dependence on peer interaction implies that problem-solving and shared explanation improve understanding. This is in accordance with the concept that knowledge develops through interaction in the Zone of Proximal Development, where students acquire from collaboration as well as guidance (Vygotsky, 1978).



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However, the findings further demonstrate that the absence of interaction possibility limits this preference from being completely realized. This preference aligns with the environmental and perceptual aspects of the Dunn and Dunn Learning Style Model, especially the visual perceptual strength, which indicates that certain learners, in their processing of information, respond better to visual input, such as demonstrations, diagrams, and multimedia presentations. According to the study of Mayer (2021), visual and multimedia instruction enhances comprehension, especially for procedural and difficult subjects. The preferences of the participants for self-directed learning can be attributed to the psychological aspects of the Dunn and Dunn Learning Style Model, especially to responsibility, persistence, and independent decision-making. Self-directed learning is characterized by the ability of an individual to alter their actions, take responsibility, make independent decisions, show initiative and creativity, and solve problems on their own, without help from others (Sumantri & Satriani, 2016).

However, the findings reveal that when students are required to re-engage in collaborative learning. Previously developed independent learning habits bring about adjustment challenges. This reflects the dynamic quality of learning preferences in the Rita Dunn and Kenneth Dunn Dunn and Dunn Learning Style Model, where learning preferences can change under various environmental and instructional circumstances. The challenge of switching from independent to collaborative learning is another indicator of the effects of long-term remote learning in the pandemic when students became more independent and less social than before, which Coman et al. (2020) support. In the constructivist view, social knowledge construction, vital in collaborative learning, is limited by poor interaction. Also, technological obstacles like unreliable internet connectivity and the absence of devices further limit access to shared learning experiences, which further adds to unequal learning opportunities, which is part of digital inequality as explained by Dhawan (2020).

To deal with the challenges, the participants have strategies of coping that focus on the use of educational videos, visual-digital resources, and self-regulated learning. The dependence on video-based resources indicates that the students rely on elaborate explanations to ensure that there is reduced interaction and the student is left to independently achieve their goals. acquire complicated concepts. Instructional videos include formalized demonstrations that assist in procedural knowledge, especially in mathematics (Fiorella & Mayer, 2018). On the other hand, noting and applying problem solving techniques enhance active participation and learning via application.

The results indicate that flexibility and adaptation are two vital qualities of learning. Instead of relying on only one of the favored ways of learning, the respondents in this study react to the natural challenges through a mixture of collaboration, visualization and independence.

This research also has its contribution to mathematics education in the form of proving that learning preferences as the described learning styles in the Dunn and Dunn Learning Style Model not only constitute cognitive tendencies but they are also under the influence of social interaction, environmental factors and psychological preparedness. The result also contributes to the constructivist theory as it demonstrates that learning is constructed during active engagement and social participation.

The results indicate that collaborative learning facilitates peaceful learning through fostering mutual engagement and minimizing isolation and visual and structured instruction minimizes uncertainty and cognitive stress. In contrast, interpersonal connections are hindered by technological Barriers and reduced communication.



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CONCLUSION

This paper has discussed the learning preferences, learning challenges and coping mechanisms of mathematics major students and analysed their implications in harmonious learning. The findings were that the participants reported a combination of collaborative, visual-digital and self-directed learning preferences, which had an impact on the way that they handled both mathematical concepts and classroom experiences. This may be construed on the basis of Rita Dunn and Kenneth Dunn Learning Style Model, according to which learners have differences in terms of sociological, perceptual, and psychological differences in the learning process. These results are also in line with constructivism, which requires that learning be reinforced by personal engagement, socialisation and development of personal comprehension.

The results imply that the peaceful learning in mathematics is fostered when the students are given an opportunity to participate in meaningful collaboration, a clear visual representation and control over their own learning. The collaborative learning promotes support, getting to know each other and less academic pressure, causing a more peaceful and inclusive learning environment. Similarly, the conceptual visual-digital supports are added to clarify and reduce confusion in solving complex mathematical problems. Peaceful learning was also strengthened through self-directed learning which enabled the students to be in-control of their own learning pace, which allows them to remain focused and to have confidence in their ability to solve problems.

At the same time, the study identified some barriers such as a lack of peer interaction, technological barriers, and problems of transitioning between independent and collaborative learning, which can interfere with an atmosphere of peaceful learning. All these issues raise the concern that there is a need to have intentional and flexible instructional practices accommodating various learning styles. An example is Teachers can begin with brief visual and structured explanations with in a 50-minute mathematics lesson. diagrams, graphs, or computer-based presentations to suit the visual-digital learning students; then continue with small-group problem-solving activities or think-pair-share to encourage collaboration and peer support; and finally, encourage self-directed learning with individual reflection and problem-solving exercises or self-paced problem-solving tasks. With such integrated plans, educators will be able to serve a range of learning preferences during the same lesson and at the same time retain engagement and minimize academic tension.

The results in general would suggest that when collaborative engagement, visual aids, and autonomy are incorporated into the mathematics learning process, a balanced and peaceful environment is achieved. Through flexible and inclusive pedagogical practices, mathematics educators will be better able to respond to the diverse learning preferences of students as well as foster both academic and positive classroom experiences among students.

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