The Learning Style of Students and Its Effect on Their Metacognitive Awareness during COVID-19 Pandemic

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Abstract: This study aims to know the effect of the learning style of students on their metacognitive awareness during the pandemic due to the CoVid-19 outbreak which will include how will the students' learning styles be described in terms of visual, auditory, and tactile, the student's level of metacognitive awareness in terms of knowledge and regulation about cognition, which of the learning styles significantly affects the student's metacognitive awareness, and also the implications that may be drawn from the findings of the study. Based on the results garnered from the participants, the findings revealed that that the students' learning style significantly affects their metacognitive awareness. The researchers concluded that the individual learning style of the students in terms of visual, auditory, and tactile has a great impact on their metacognitive awareness in terms of knowledge about cognition and regulation of cognition. This study recommended that teachers may attempt to do multiple visual, auditory, tactile assessments, for students to experiment with what learning style is effective for them providing objects of all kinds (lecture recording, written work, etc.) that may also help the students be aware of how it affects their metacognitive awareness.

Keywords—Learning Style of Students, Metacognitive Awareness, Descriptive-correlational Stud

1. INTRODUCTION

Learning styles apply to the preferred forms of learning for students that can play an important role in adaptive e-learning systems. With the experience of various types, the framework will give students and teachers useful guidance and directions to improve the learning processes of students [1]. A learning style can also be constant and will not change, depending on a student's ability and performance in school with factors such as intellect or even technique to slither their way to escape tons of work due to internal factors like laziness or slacking. As the pandemic continues and has not yet died down, the Department of Education pushed through with what they call Virtual Learning, or as what we call, Online Classes.

Online learning is an important family of machine learning algorithms in which, by learning a model/hypothesis from a series of data instances one at a time, a learner attempts to solve an online prediction (or any form of decision-making) problem. The purpose of online learning is to ensure that, provided the knowledge of correct responses to prior prediction or learning tasks and probably additional details, the online learner can make a sequence of precise predictions (or correct decisions). This forced students to adapt to a modern method of learning, which is distinct from the one they have applied for years during on-campus classes. [2].

Metacognition implies "thinking about the thinking of oneself." Metacognition has two aspects: —reflection — thinking about what we know and self-regulation — managing how we understand. Taken together, these procedures constitute an essential aspect of learning and development. It is not simply about becoming reflective learners to improve these metacognitive skills, but also about acquiring unique learning strategies. Metacognitive understanding means becoming conscious of how you think. Metacognition is the understanding of the thought of one and the methods that one uses. This encourages students to be more aware of what they are doing, why, and how the skills they are learning can be applied differently in various circumstances [3].

Exploring the relationship between both can reveal how there will be both positive and negative conflicts. The positive conflict would be how a student would be able to adapt to the sudden shift of school dynamics from campus-based to home-based yet will slowly develop a new learning strategy. The negative conflict would be how the student will be in a lose-lose scenario – unable to adapt through the sudden change and thus, fail to adapt to a new learning style.

As the study progresses, the researchers aim to examine the relationship between the learning style of the students and their metacognitive awareness as the COVID 19 continues as a crisis and a factor in affecting the country's educational development.

2. RELATED WORKS

There is a lot of way of possible learning style for metacognition. Unfortunately, not all of it is effective and not all of it applies to the majority of students. One research shows that students who are more aware of their metacognitive strategies also have more developed abilities to read and understand visual and written material, which is a sub-dimension of the perception of self-efficacy in reading comprehension. By using this observation, it can also be

asserted that activities promoting and improving students' metacognitive reading strategies will have a beneficial impact and cause their expectations of self-efficacy in reading to increase [14]. In addition to that, another research stated that an online discussion is also a tool for tracking the metacognitive processing of learners. It allows teachers to adjust teaching, i.e., participate in metacognitive instruction, based on the needs of the class. For instance, I always choose to focus on anxiety and tools for coping with anxiety and test anxiety in the next class period after seeing many posts and answers about anxiety. The discussion board is also an important tool for meta-motivational monitoring in this respect [15], also a significant factor in school functioning is the achievement of knowledge of one's cognition and how to control it in the primary years.

Previous research indicates the crucial role of adults in promoting the metacognitive awareness of children, especially procedural [16]. A study also showed that in the kinesthetic learning style, the highest percentage of "improved well" metacognitive skill categories was found. Meanwhile, in all types of learning styles, the "not improved" metacognitive skill category was not found [17]. This means that students improve their metacognitive skills when they can touch or interact with the material. On top of that, research also stated that the performed research to investigate if the learning styles and metacognitive skills affected any significant impact on the critical thinking ability of Korean Education students showed that the findings suggest that the Student Imagination Program can be used as a suitable medium to hone and develop the critical thinking of students. It is also important to encourage students to enter the creativity program in addition to teaching and learning in the classroom, so they can channel their creativity while honing their critical thinking skills [18].

Metacognition refers to an individual's awareness of one's self. It is the ability to be acquainted with how one processes information by critical analysis and monitor one's performance and modify it beneficially. In the context of studying, metacognitive awareness is a significant influence in enhancing critical thinking [4]. Critical thinking is necessary to develop for students to collect, analyze, and evaluate information and not depend on their rationale. Therefore, it is vital for the metacognitive skills of students to develop. An article concluded that to do so, students must undergo learning processes [5].

Multiple attempts have been made to find the best option to improve metacognitive awareness. Inquiry cycles such as planning and analyzing and group discussions are acceptable metacognitive and cognitive techniques to improve a student's critical thinking and engage metacognition awareness [6][7]. Related studies have shown that metacognition awareness levels are affected by gender, learning styles, age, and level of education. However, there is no relationship between learning styles and gender [8][9]. Students with a higher learning goal orientation and instill metacognitive strategies with metacognitive feedback from teachers deepens understanding of

information, increases motivation, and improves academic achievement by developing more effective coping styles [10][11][12].

A recent study's findings showed the positive outcomes when metacognitive awareness influences the learners' study habits, and in turn, improves performance. Learning-oriented students have better academic performance because of the utilization of cognitive and metacognitive strategies. However, unskilled students who lack metacognitive strategies and have no knowledge of when to use them can cause circumstances where the benefits are outweighed such as interfering with task performance [13].

There are a lot more possible learning styles and metacognitive awareness that are undiscovered and might help students. As a group of researchers, the researchers seek to contribute to how the researchers can explore the diverse world where there is more to find.

Through these gaps found in related studies, the researcher aims to assess the effect of learning styles on the metacognitive awareness of students in another private school form of a survey in Marilao, Bulacan.

3. STATEMENT OF THE PROBLEM

This study aims to examine and analyze the effects of learning styles on the metacognitive awareness of the students. Specifically, the study seeks to find answers to the following questions:

1. How may the students' learning styles be described in terms of the following indicators:
    1.1 visual;
    1.2 auditory; and,
    1.3 tactile?

2. What is the level of students' metacognitive awareness in terms of the following aspects:
    2.1 knowledge about cognition; and,
    2.2 regulation of cognition?

3. Which among students' learning styles significantly affect metacognitive awareness?

4. What implications may be drawn from the findings of the study?

4. METHODOLOGY

As this concerns the classification of the independent and dependent variables, the researchers made use of the descriptive-correlational research method. A correlational research design requires data collection to assess if there are effects between two or three independent variables and dependent variables and to what degree.: Specifically, this study aims to know if there is any impact on the metacognitive awareness of the students based on their learning styles.

The primary data gathering tools used in the study were standardized questionnaires on determining students on their learning style and Metacognitive Awareness.

The respondents of the study consisted of 118 students during the school year of 2020-2021. The researchers used the convenience Likert scale technique for the study sample.

To gather information for this study, researchers have standardized questionnaires to identify the Learning style and Metacognitive awareness of students. The standardized questionnaires consist of five (5) dimensions with two (2) different aspects. The questionnaires are prepared with the Likert scale method. The Learning style consists of three (3) dimensions: visual, auditory, and tactile. Visual has eight (8) questions, auditory has eight (8) questions and tactile has eight (8) questions, in a total of twenty-four (24) questions in Learning style. While Metacognitive awareness has two (2) dimensions: knowledge about cognition and regulation about cognition.

The knowledge about cognition has three (3) sectors: declarative knowledge, procedural knowledge, and conditional knowledge. Procedural knowledge has four (4) questions, declarative knowledge has eight (8) questions and conditional knowledge has five (5) questions. While, in regulation about cognition has five (5) sectors: planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation. Planning has seven (7) questions, information management strategies have ten (10) questions, comprehension monitoring has seven (7) questions, debugging strategies has five (5) questions, and evaluation has six (6) questions, in a total of fifty-two (52) questions in Metacognitive awareness.

The mode of the gathering was the questionnaire method. In gathering the data, the researchers followed the procedures:

The researchers asked permission from the respondents before conducting a survey. A message was sent thru their accounts and the study was conducted on the Google Forms. The researcher collected the questionnaires from Google Forms and checked whether they respond to all the questions

5. RESULTS

Students' Learning Style

Different circumstances determined students' learning style preferences: visual, auditory, and tactile. In this aspect, this features the circumstances related to metacognitive awareness.

The visual learning method means that the learner/student learns best by using images, pictures, colors, computers, and any other visual media to help them learn.

Examples of visual learning methods are watching videos, a study by looking over things, using diagrams and charts to understand ideas and concepts, and many more [19]. Visual learning is often referred to as the spatial learning style. Students who prefer the visual learning method have a good sense of direction because they can read maps. They often do well in class tests because they remember where the information is and can see it written down.

Auditory learning refers to a student's ability to take in information effectively through listening [20]. A student might prefer listening to a lecture on reading textbooks. Auditory learners usually show characteristics of being a good listener, can notice changes in sound such as background noises and silence and possess good memory for information given through audio.

The tactile learning method means that the learner/student learns from touching, moving, and feeling. Examples of tactile learning methods are drawing, building, making physical activities, etc. [21]. Tactile learning is also known as kinesthetic learning. People who struggle with concentrating sometimes prefer tactile learning over the other learning methods for you can interact with the learning tools. Examples of where tactile learning is used often are at the kinder garden, home, school, and even in daily life. It is used also on subjects like Physical Education, Chemistry, Biology, etc.

Table 1. Students' Learning Style

Indicators	Frequency	Percentage
Visual	224	36.10%
Auditory	178	28.66%
Tactile	219	35.27%
Total	621	**100%**

This may be gleaned in table 1 that the frequency of the Students' Learning Style shows that they are most likely to use visual often, with a high percentage. The researchers can determine how visual learning effects and helps students in their studies.

Students' Metacognition Awareness in Knowledge of Cognition

Table 1. Metacognition Awareness in terms of Declarative Knowledge in Knowledge of Cognition

Indicators	Mean	Interpretation
5. I understand my intellectual strengths and weaknesses.	54	True
10. I know what kind of information is most important to learn.	54	True
12. I am good at organizing information.	41	True
16. I know what the teacher expects me to learn.	41	True

17. I am good at remembering information.	35	False
20. I have control over how well I learn	43	True
32. I am a good judge of how well I understand something	41	True
46. I learn more when I am interested in the topic.	62	True
Average	**46.38**	**True**

This could be garnered in table 1 that the Metacognition Awareness in terms of Declarative Knowledge in Knowledge of Cognition was adequately shown by the average score of 46.62. This Declarative Knowledge was reflected in the following behaviors of respondents when they talk regarding understanding intellectual strengths and weaknesses (54), kind of information that is most important to learn (54), good at organizing information (41), their knowledge on what the teacher expects them to learn (41), how good at remembering information (35), control over how well they learn (43) and how well they understand something (41).

Table 2. Metacognition Awareness in terms of Procedural Knowledge in Knowledge of Cognition

Indicators	Mean	Interpretation
3. I try to use strategies that have worked in the past.	59	True
14. I have a specific purpose for each strategy I use.	58	True
27. I am aware of what strategies I use when I study.	43	True
33. I find myself using helpful learning strategies automatically.	47	True
Average	**51.75**	**True**

In Table 2, Metacognition Awareness in terms of Procedural Knowledge in Knowledge of Cognition shown the average score of 51.75. The respondents try to use strategies that have worked in the past (59), have a specific purpose for each strategy they use (58), the respondents are aware of what strategy they use (43), using helpful learning strategies automatically (47).

Table 3. Metacognition Awareness in terms of Conditional Knowledge in Knowledge of Cognition

Indicators	Mean	Interpretation
15. I learn best when I know something about the topic.	59	True
18. I use different learning strategies depending on the situation.	53	True
26. I can motivate myself to learn when I need to.	56	True
29. I use my intellectual strengths to compensate for my	52	True
weaknesses.		
35. I know when each strategy I use will be most effective.	52	True
Average	**54.4**	**True**

In Table 3, Metacognition Awareness in terms of Conditional Knowledge in Knowledge about Cognition shown an average score of 54.4. When learning, best to if know something about the topic (59), use different learning strategies depending on the situation (53), motivation to learn (56), use intellectual strengths to compensate the weaknesses (52), use is known when each strategy that will be most effective (52).

Students' Metacognition Awareness in Regulation of Cognition

Table 1. Metacognition Awareness in terms of Planning In Regulation of Cognition

Indicators	Mean	Interpretation
4. I pace myself while learning in order to have enough time.	53	True
6. I think about what I really need to learn before I begin a task.	50	True
8. I set specific goals before I begin a task.	50	True
22. I ask myself questions about the material before I begin.	37	True
23. I think of several ways to solve a problem and choose the best one.	51	True
42. I read instructions carefully before I begin a task.	57	True
45. I organize my time to best accomplish my goals.	43	True
Average	**48.71**	**True**

Based on Table 1 in Metacognition Awareness in terms of Planning in Regulation of Cognition, more students answered "True" in the planning topic, the average number for the question in planning topic is (48.71). It also shows that all the answers are considered true because most of the students agreed to the questions that they answered from the survey.

Table 2. Metacognition Awareness in terms of Information Management Strategies in Regulation of Cognition

Indicators	Mean	Interpretation
9. I slow down when I encounter important information.	57	True
13. I consciously focus my attention on important information.	52	True

30. I focus on the meaning and significance of new information.	54	True
31. I create my examples to make information more meaningful.	51	True
37. I draw pictures or diagrams to help me understand while learning.	37	False
39. I try to translate new information into my own words.	59	True
41. I use the organizational structure of the text to help me learn.	45	True
43. I ask myself if what I'm reading is related to what I already know.	56	True
47. I try to break studying down into smaller steps.	55	True
48. I focus on overall meaning rather than specifics.	40	True
Average	**50.6**	**True**

Table 2 Metacognition Awareness in terms of Information Management Strategies in Regulation of Cognition shows that the average of numbers is 50.6. As observed, more students agreed except for the 5th question. This means that more students who answered the survey do not prefer drawing pictures or diagrams to help them understand while learning.

Table 3. Metacognition Awareness in terms of Comprehension Monitoring in Regulation of Cognition

Indicators	Mean	Interpretation
1. I ask myself periodically if I am meeting my goals.	54	True
2. I consider several alternatives to a problem before I answer.	56	True
11. I ask myself if I have considered all options when solving a problem.	46	True
21. I periodically review to help me understand important relationships.	39	True
28. I find myself analyzing the usefulness of strategies while I study.	47	True
34. I find myself pausing regularly to check my comprehension.	48	True
49. I ask myself questions about how well I am doing while learning something new.	48	True
Average	**48.28**	**True**

Table 3 in Metacognition Awareness in terms of Comprehension Monitoring in Regulation of Cognition revealed that 48.28 is the average number. It is also observed that all of the answers are considered true for the reason that majority of

the students who answered the survey are agreeing with the questions from the questionnaire.

Table 4. Metacognition Awareness in terms of Evaluation in Regulation of Cognition

Indicators	Mean	Interpretation
7. I know how well I did once I finish a test.	45	True
18. I ask myself if there was an easier way to do things after I finish a task.	53	True
24. I summarize what I've learned after I finish.	38	True
36. I ask myself how well I accomplish my goals once I'm finished.	52	True
38. I ask myself if I have considered all options after I solve a problem.	44	True
49. I ask myself if I learned as much as I could have once I finish a task.	48	True
Average	**46.67**	**True**

Metacognition Awareness in terms of Evaluation in Regulation of Cognition findings in table 4 proved that most students know how well they did once they finished a test. It also showed that students find an easier way to do things after they finish a task. The majority of the respondents summarize what they've learned after they've finished a class. Respondents also ask if they've considered all other options after they've solved a problem and lastly students ask themselves if they've learned as much as they could once, they've finished a task.

Table 5. Metacognition Awareness in terms of Debugging Strategies in Regulation of Cognition

Indicators	Mean	Interpretation
25. I ask others for help when I don't understand something.	55	True
40. I change strategies when I fail to understand.	55	True
44. I re-evaluate my assumptions when I get confused.	54	True
51. I stop and go back over new information that is not clear.	58	True
52. I stop and reread when I get confused.	56	True
Average	**55.6**	**True**

Table 5 shows that the effectiveness of debugging strategies in terms of the students' Metacognition Awareness in terms of Debugging Strategies in Regulation of Cognition appears to be "True" with an average score of 55.6. Students implement these kinds of strategies to help them improve

their skills. The 4th statement possesses the highest mean score with the correlation result of "True". Statement 3 got the lowest mean score with the correlation result of "true".

6. DISCUSSION

The individual learning style of the students significantly affects their metacognitive awareness as evidenced by 0.98 correlation coefficients.

The researchers may conclude that individual learning style of the students in terms of visual, auditory, and tactile have a great impact on their metacognitive awareness in terms of knowledge about cognition and regulation of cognition.

7. CONCLUSIONS

Based on the study, we gathered information to the following conclusion: The learning style of students and its effect on their metacognitive awareness during this pandemic. first, learning style preference is a convenient guide for the students and teachers to enhance the learning mechanisms of students. second; metacognitive practices help students' abilities to adapt their learning to the new kind of learning system which is the e-learning system [22].

8. RECOMMENDATIONS

In the conclusion and findings of the study, the researchers provide the following scope for upcoming research; (1) motivation of students in improving their metacognitive awareness, (2) dig in more about learning styles and techniques of students and teachers that would help them in understanding their studies better, (3) students' metacognitive awareness needs attention to ameliorate their standard knowledge, (4) evidence-based inferences drawn from the study.

For the limitation of the study, first; is the number of respondents. The researchers recommend appraising a greater number of students to be involved in the study, to make the findings more defensible and dependable. Second, the respondents should consider other students in other areas, provinces, or regions. Also, the researchers suggest considering other methods in gathering data and responses. In addition to this, the researchers used Google Forms in gathering responses, and it might also be a big help for future researchers, to make their gathering of data easier. This study also needs more justification and more information about students' learning styles and metacognitive awareness. This study recommended that teachers may attempt to do multiple visual, auditory, tactile assessments, for students to experiment with what learning style is effective for them providing objects of all kinds (lecture recording, written work, etc.) that may also help the students be aware of how it affects their metacognitive awareness.

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