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INFLUENCE OF METACOGNITIVE AWARENESS ON STUDENTS ACADEMIC PERFORMANCE: AN EMPIRICAL STUDY OF MUMBAI METROPOLITAN AREA

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Abstract

Thinking processes and self-awareness varies from individual. They play a crucial role in how an individual perceive, process, and understand information. The mental process involved in acquiring, storing, retrieving and using knowledge is known as cognition. Perception, Attention, Memory, Language, Problem Solving, Decision making are the key components of cognition. The awareness and understanding of one's own cognitive processes is known as Metacognition. It is all about the ability to monitor, control and regulate one's thinking. In simple terms it is "thinking about thinking". As India boasts one of the world's greatest youth populations. Mumbai being the 'Dream City" of India has highest young population. Technological advancements have drastically impacted the thinking process of this young population. For exploring these phenomena researchers undertook cross-sectional research using the MBA and MCA students in the age group of 20 to 25 years; residing in the Mumbai Metropolitan Area. 270respondents participated in this study. 'Meta-cognitive awareness inventory' consisting of 53 questions was used. Nine constructs were considered-Thinking process', 'Cognitive abilities', 'Knowledge about cognition', 'Learning abilities', 'Academic performance', 'Learning adaptability', 'Self-regulation's, 'Problem solving skills' and 'Motivation and Engagement'. The reliability of each of the constructs was measured using Cronbach alpha. The adequacy of the sample size was verified using KMO and Bartlett's test. To test the hypothesis, structural equation modelling was employed. The research structural model fit appeared quite sound since all fit indices were acceptable ($\chi 2/df$ = 1.992, NFI =0.844, RMSEA = 0.041 and CFI = 0.853).

JEL Categories: I21, I23, C90.

Keywords: Metacognitive Awareness, Academic Performance, Learning Adaptability, Self-Regulation, Problem-Solving Skills, Motivation and Engagement.

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INTRODUCTION

The influence of metacognitive awareness on students' academic performance has been a subject of interest in educational field. Metacognition refers to an individual's ability to reflect on and regulate their own thinking processes. It involves being aware of one's knowledge, strategies, and cognitive abilities as well as knowing how to apply them effectively in different situations.

Metacognitive awareness plays a crucial role in learning and academic performance because it allows students to monitor their own understanding, plan their learning strategies and make adjustments as needed.

Though several studies have been conducted to examine the relationship between metacognitive awareness and academic performance of the students across various educational domains but this field is very dynamic as the set of students/learners keep on changing with the time. The most accurate label to describe the youth of the today is Generation Z (born 1997-2012 -11-26 years old) and Generation Alpha (born early 2010s-2025 – upto10 years old)[1].

The influence of metacognitive awareness on academic performance varies depending upon factors like age, prior knowledge and educational stream. Furthermore other factors like socioeconomic status, teaching quality and environmental factors also impact students' academic performance. Gen Z is growing up in a technologically advanced and interconnected world, with easy access to information through the internet and social media platforms. This constant exposure to a wealth of information has shaped their cognitive development and contributed to their meta-cognitive awareness in several ways:

Information Literacy: Gen Z has developed a keen sense of evaluating and discerning information sources. They are generally more sceptical and critical of the information they encounter, knowing that not everything online is accurate or reliable. This heightened awareness of potential biases and misinformation helps them navigate through vast amounts of information.

Adaptability and Self-learning: Gen Z has grown up in a fast-paced, ever-changing digital landscape. They are more adaptable and accustomed to learning independently. Due to their awareness of the need to constantly update their knowledge and learn new abilities to stay up with changing technology and societal expectations, they tend to have meta-cognitive awareness.

Online Collaboration and Feedback: Gen Z's digital upbringing has fostered a culture of collaboration and sharing. They actively seek and engage with online communities and social networks to exchange ideas, seek feedback, and gain different perspectives. This collaborative approach enhances their meta-cognitive awareness by exposing them to diverse viewpoints and encouraging reflection on their own thoughts and beliefs.

Mental Health Awareness: Gen Z has been at the forefront of discussions surrounding mental health and self-care. They are more open about their emotions and actively seek

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resources to address their mental well-being. This heightened awareness of their own mental states and the importance of self-reflection contribute to their meta-cognitive development.

Gen Z's exposure to the digital world, coupled with their ability to adapt and engage with information critically has contributed to their meta-cognitive awareness. This generation is often characterized by their ability to navigate complex information environments and actively reflect on their own thinking processes. This research study aims to examine the relationship between metacognitive awareness and academic performance of the Gen Z students belonging to Arts, Commerce, Science, Management and Technology streams residing in Mumbai Metropolitan Area

Objectives of the Study

- To assess the impact of metacognitive awareness on students' learning adaptability and academic performance.
- To identify the impact of metacognitive awareness on students' self-regulation, motivation and engagement.
- To analyse the impact of metacognitive awareness on students' problem-solving skills.

Formulation of Hypotheses

1. H0: Metacognitive awareness has no significant impact on students' learning adaptability

   H1: Metacognitive awareness has a significant impact on students' learning adaptability

2. H0: Metacognitive awareness has no significant impact on students' academic performance.

   H1: Metacognitive awareness has a significant impact on students' academic performance.

3. H0: Metacognitive awareness has no significant impact on students' self-regulation

   H1: Metacognitive awareness has a significant impact on students' self-regulation

4. H0: Metacognitive awareness has no significant impact on students' motivation and engagement.

   H1: Metacognitive awareness has a significant impact on students' motivation and engagement.

5. H0: Metacognitive awareness has no significant impact on students' problem-solving skills.

   H1: Metacognitive awareness has a significant impact on students' problem-solving skills.

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LITERATURE REVIEW

Academic performance of a student depends upon many factors like his own competencies, zeal to study, academic environment, family environment etc. One of critical contributor behind the academic performance of any student is his/her awareness about their own metacognitive skills. All these factors are dynamic in nature. This literature review presents the extracts of some of the studies carried out in this field.

Özçakmak, Köroğlu, Korkmaz and Bolat (2021) conducted a study to understand the metacognitive awareness of pre-service teachers studying at the faculty of education at one of the University at Turkey. Academic achievement and metacognitive awareness are closely linked and positively influence each other. Pre-service teachers with higher academic scores were high on metacognitive awareness.

Devika & Singh (2018) presented the relation between metacognitive awareness and listening skills of engineering students. Aware, Work, Analyze, Result orientation and Evaluation (AWARE) this concept has been used in this research. For self-directed learning and action oriented learning listening skills plays an important role. The study revealed that metacognitive awareness help in processing the information.

Panda (2017) performed an investigative study to understand that how college students' development of metacognitive awareness was influenced by their age and gender. Research findings revealed that in terms of metacognitive knowledge, girls outperform boys greatly, but the reverse is true for metacognitive control. While boys are found to have much better metacognitive regulation, girls are found to have significantly greater metacognitive knowledge. Gender differences in metacognitive control and execution were not found.

Karbalaei (2010) conducted a comparative study of metacognitive reading strategies used by EFL and ESL Readers. The study's findings revealed that despite studying English in very different socio-cultural contexts (EFL vs. ESL), both groups displayed very comparable patterns of strategy awareness and reported usage when reading college-level literature in English. Both groups lack a strong understanding of how to use a variety of practical and efficient tactics for greater comprehension, such as summarising, underlining, or taking notes.

Mishra and Panwaretal (2019) tested the impact of age and gender on metacognitive awareness inventory of first year MBBS students. The meta-cognitive awareness inventory scale revealed that female students and students under the age of 20 had a stronger link with the cognitive process. It was discovered that female students and younger students performed higher on all MCAI scales and subscales.

Tuononenetal (2022) performed a diagnostic study to understand the metacognitive awareness and learning profiles of HEI students. Regulation of cognition, knowing about cognition is significant factors of metacognitive awareness. Both these factors are intensely linked to individual learning, studying and performing. Research findings revealed that the students having a high score on knowledge about cognition are having

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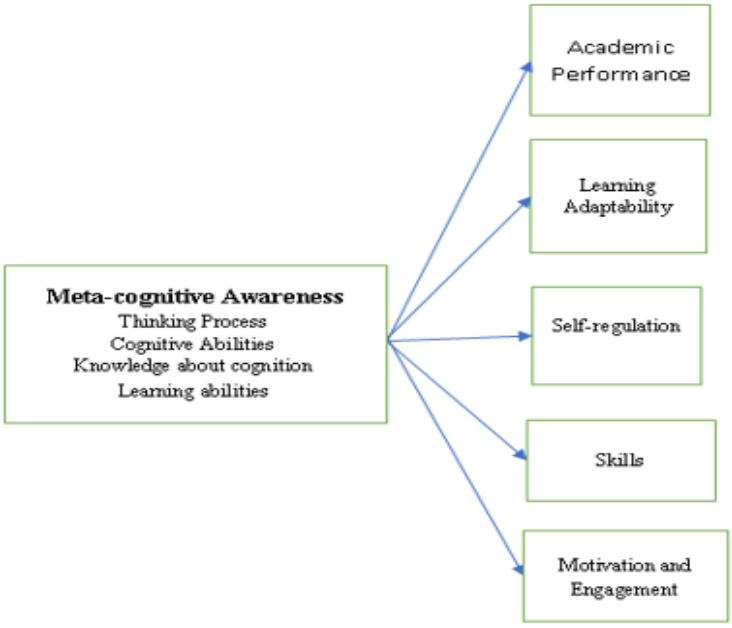
high score for regulation of cognition but having lowest score on the unreflective approach.

Abdelrahman (2020) looked into how academic motivation and metacognitive awareness affected Ajman University students' academic performance. Higher degrees of metacognitive awareness are associated with improved academic performance, according to the study, which also identified a positive relationship between metacognitive awareness and academic achievement. The study also emphasized the function of academic motivation as a mediating element, suggesting that motivated students may use metacognitive techniques more successfully and achieve better academic results.

A research study on the relationship between academic achievement and metacognitive awareness in first-year college students was conducted by Ward and Butler (2019). The outcomes indicated that metacognitive awareness and academic accomplishment were substantially positively correlated, with students who had greater levels of metacognitive awareness achieving better on their assignments. The study underlined that adopting metacognitive training programs to college curricula could help students achieve their learning objectives and succeed academically.

The metacognitive awareness of undergraduate students in connection to their learning outcomes was investigated by Sawhney and Bansal (2015). Higher grades are usually obtained by students who display a stronger metacognitive awareness, based on their investigation they revealed that there is a positive correlation between the two variables. The study also emphasized how critical it is to incorporate metacognitive techniques into academic training to improve students' cognitive self-regulation and learning efficacy.

Theoretical Framework



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RESEARCH METHODOLOGY

The purpose of the study is to collect data from Gen Z management MBA and MCA students in the age group of 20 to 25 years located at Mumbai and Navi Mumbai. This study used both qualitative and quantitative methods to assess the impact of metacognitive awareness on students' learning adaptability, academic performance, self-regulation, motivation and problem-solving skills. Survey method was used to collect primary data from 270 Gen Z students. These students were selected using judgement sampling. Secondary data was obtained from various research papers on Google Scholar, ProQuest and EBSCO and other databases. This study aimed to find out how meta-cognitive awareness among students has a positive effect on their learning adaptability, academic performance, self-regulation, motivation, and problem-solving skills. Nine constructs were considered: 'Thinking process', 'Cognitive abilities', 'Knowledge about cognition', 'Learning abilities', 'Academic performance', 'Learning adaptability', 'Self-regulation's, 'Problem solving skills' and 'Motivation and Engagement'. Out of these 9 constructs, the first four constructs namely 'Thinking process', 'Cognitive abilities', 'Knowledge about cognition' and 'Learning abilities' are included under Meta-cognitive awareness which is the independent variable. The dependent variables are 'Academic performance', 'Learning adaptability', 'Self-regulation's, 'Problem solving skills' and 'Motivation and Engagement'. The questionnaire consisted of 53 questions, apart from gender. These 53 questions were rated on a scale of 1 to 5 by the respondents, where 1 is the lowest and 5 is the highest. The 53 questions were broken down into -

(i) Five questions pertaining to 'Thinking process' among Gen Z management students.

(ii) There are eight questions on 'Cognitive abilities' ten questions on 'Knowledge about cognition' and ten questions pertaining to 'Learning abilities'

(iii) There are 5 questions on 'Academic performance', three questions on 'Learning adaptability' and four questions each on 'Self-regulation', 'Problem solving skills' and 'Motivation and Engagement'.

The reliability of each of the constructs was measured using Cronbach alpha. The adequacy of the sample size was verified using KMO and Bartlett's test. Structural Equation Modelling was used to test the proposed hypotheses. The research structuralmodel fit appeared quite sound since all fit indices were acceptable ($\chi 2/df$ = 1.992, NFI =0.844, RMSEA = 0.041 and CFI = 0.853).

Data Analysis & Interpretations

(i) Descriptive Statistics

Table 1: Profile of Respondents

Gender					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Male	149	55.2	55.2	55.2
	Female	121	44.8	44.8	100.0
	Total	270	100.0	100.0	

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The above table shows that the percentage of male respondents were more than female respondents.

(ii) Reliability of the Constructs is obtained using Cronbach alpha

Reliability Statistics for Constructs

Table 2: Reliability of various Constructs

Construct	Cronbach alpha
Thinking process	0.831
Cognitive abilities	0.867
Knowledge about cognition	0.873
Learning abilities	0.892
Academic performance	0.798
Learning adaptability	0.814
Self-regulation	0.872
Problem solving skills	0.871
Motivation and engagement	0.825

Since the value of Cronbach alpha > 0.7 for all the constructs, it shows that all the constructs have high reliability.

(iii) Sample Size Adequacy

Table 3: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.959
Bartlett's Test of Sphericity	Approx. Chi-Square	9419.952
	df	1378
	Sig.	.000

The above table reveals that since the KMO value > 0.7, it shows that the sample size is sufficient for conducting factor analysis. Also, the sig. value in the Bartlett's test is 0.000< 0.05. This shows that the data is suitable for conducting factor analysis.

(iv) Structural Equation Modelling is done using AMOS software to test the hypotheses and to find the model fit and test its validity.

Summary of Testing of Hypotheses

Table 4: Summary of Testing of Hypotheses

Sr. No.	Hypothesis	Test used	Significance Value	Decision	Conclusion
1.	H1: Metacognitive awareness has a significant impact on students' learning adaptability	Regression using SEM	P=0.043	Accept H1	Metacognitive awareness has a significant impact on students' learning adaptability
2.	H2: Metacognitive awareness has a significant impact on	Regression using SEM	P=0.049	Accept H2	Metacognitive awareness has a significant impact on

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	students' academic performance.				students' academic performance
3.	H3: Metacognitive awareness has a significant impact on students' self-regulation	Regression using SEM	P=0.049	Accept H3	Metacognitive awareness has a significant impact on students' self-regulation
4.	H4: Metacognitive awareness has a significant impact on students' motivation and engagement.	Regression using SEM	P=0.049	Accept H4	Metacognitive awareness has a significant impact on students' motivation and engagement.
5.	H5: Metacognitive awareness has a significant impact on students' problem-solving skills.	Regression using SEM	P=0.042	Accept H5	Metacognitive awareness has a significant impact on students' problem-solving skills.

(v) Path Diagram

The path diagram is as follows:

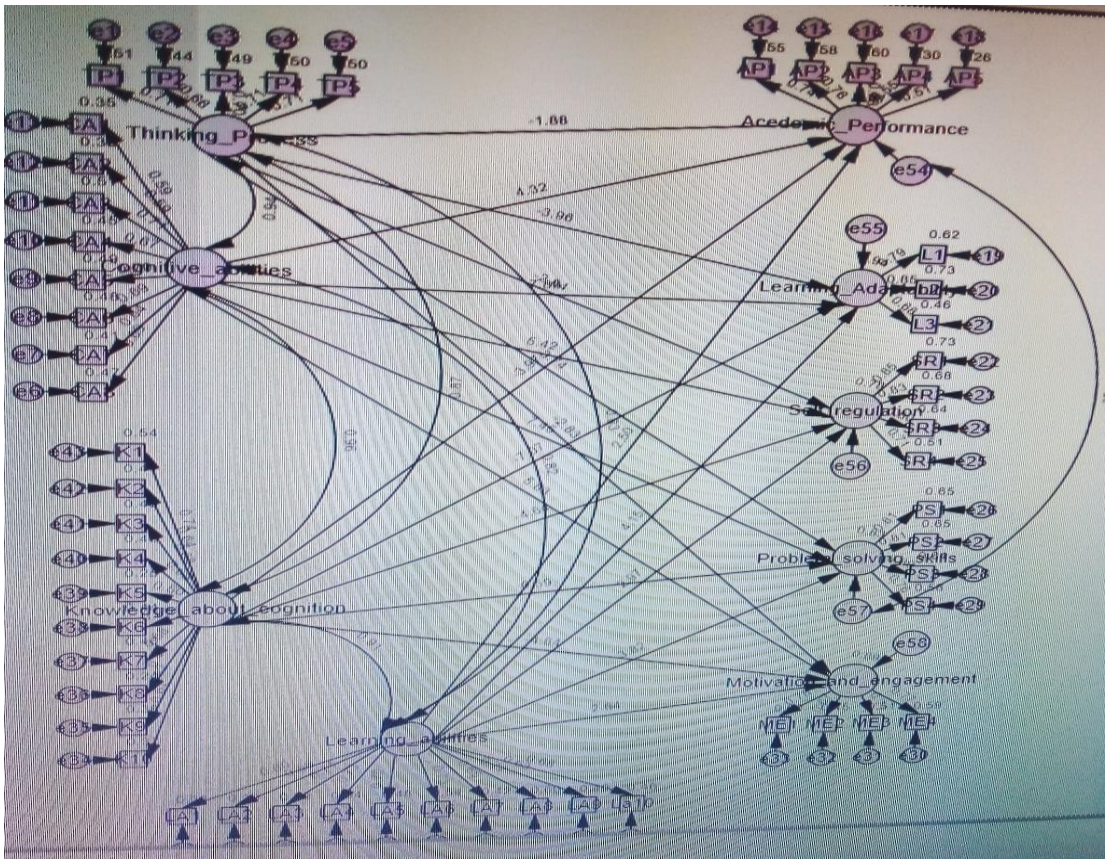

Figure 1: Path Diagram

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(vi) Model Fit Summary

CMIN

Table 5: CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default Model	186	2585.041	1298	.000	1.992
Saturated Model	1484	.000	0		
Independence Model	106	10115.637	1378	.000	7.341

Baseline Comparisons

Table 6: Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default Model	.844	.829	.854	.844	.853
Saturated Model	1.000		1.000		1.000
Independence Model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Table 7: Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default Model	.942	.801	.803
Saturated Model	.000	.000	.000
Independence Model	1.000	.000	.000

RMSEA

Table 8: RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default Model	.041	.047	.054	.000
Independence Model	.154	.151	.156	.000

Standardized Regression Weights: (Group Number 1 - Default Model)

Table 9: Standardized Regression Weights

			Estimate
Acedemic_Performance	<---	Thinking_Process	1.878
Learning_Adaptability	<---	Thinking_Process	3.964
Self_regulation	<---	Thinking_Process	2.836
Problem_solving_skills	<---	Thinking_Process	3.739
Motivation_and_engagement	<---	Thinking_Process	2.831
Acedemic_Performance	<---	Cognitive_abilities	4.316
Learning_Adaptability	<---	Cognitive_abilities	7.888
Self-regulation	<---	Cognitive_abilities	5.419
Problem_solving_skills	<---	Cognitive_abilities	7.455
Motivation_and_engagement	<---	Cognitive_abilities	5.830

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			Estimate
Acedemic_Performance	<---	Knowledge_about_cognition	3.971
Learning_Adaptability	<---	Knowledge_about_cognition	7.065
Self_regulation	<---	Knowledge_about_cognition	4.639
Problem_solving_skills	<---	Knowledge_about_cognition	6.587
Motivation_and_engagement	<---	Knowledge_about_cognition	4.841
Acedemic_Performance	<---	Learning_abilities	2.498
Learning_Adaptability	<---	Learning_abilities	4.146
Self_regulation	<---	Learning_abilities	2.969
Problem_solving_skills	<---	Learning_abilities	3.821
Motivation_and_engagement	<---	Learning_abilities	2.843
TP1	<---	Thinking_Process	.714
TP2	<---	Thinking_Process	.664
TP3	<---	Thinking_Process	.700
TP4	<---	Thinking_Process	.708
TP5	<---	Thinking_Process	.706
CA8	<---	Cognitive_abilities	.685
CA7	<---	Cognitive_abilities	.640
CA6	<---	Cognitive_abilities	.694
CA5	<---	Cognitive_abilities	.701
CA4	<---	Cognitive_abilities	.669
CA3	<---	Cognitive_abilities	.711
CA2	<---	Cognitive_abilities	.594
CA1	<---	Cognitive_abilities	.590
AP1	<---	Acedemic_Performance	.742
AP2	<---	Acedemic_Performance	.763
AP3	<---	Acedemic_Performance	.777
AP4	<---	Acedemic_Performance	.547
AP5	<---	Acedemic_Performance	.511
L1	<---	Learning_Adaptability	.788
L2	<---	Learning_Adaptability	.853
L3	<---	Learning_Adaptability	.680
SR1	<---	Self_regulation	.855
SR2	<---	Self_regulation	.827
SR3	<---	Self_regulation	.799
SR4	<---	Self_regulation	.713
PS1	<---	Problem_solving_skills	.808
PS2	<---	Problem_solving_skills	.806
PS3	<---	Problem_solving_skills	.797
PS4	<---	Problem_solving_skills	.764
ME4	<---	Motivation_and_engagement	.769
ME3	<---	Motivation_and_engagement	.711
ME2	<---	Motivation_and_engagement	.673
ME1	<---	Motivation_and_engagement	.778

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			Estimate
K10	<---	Knowledge_about_cognition	.606
K9	<---	Knowledge_about_cognition	.617
K8	<---	Knowledge_about_cognition	.494
K7	<---	Knowledge_about_cognition	.675
K6	<---	Knowledge_about_cognition	.660
K5	<---	Knowledge_about_cognition	.505
K4	<---	Knowledge_about_cognition	.691
K3	<---	Knowledge_about_cognition	.681
K2	<---	Knowledge_about_cognition	.640
K1	<---	Knowledge_about_cognition	.736
La10	<---	Learning_abilities	.678
LA9	<---	Learning_abilities	.629
LA8	<---	Learning_abilities	.774
LA7	<---	Learning_abilities	.647
LA6	<---	Learning_abilities	.733
LA5	<---	Learning_abilities	.695
LA4	<---	Learning_abilities	.734
LA3	<---	Learning_abilities	.708
LA2	<---	Learning_abilities	.548
LA1	<---	Learning_abilities	.598

RESULTS FINDINGS AND CONCLUSION

Data analysis reveals that all constructs had high reliability since the value of Cronbach alpha is greater than 0.7. To estimate the fitness of the model estimates, the $\chi 2$ statistic (CMIN/d.f.), Normed fit Index (NFI), Comparative Fit Index (CFI) and Root Mean square error of approximation (RMSEA) were assessed using AMOS and SPSS. The model yielded acceptable fit indices: $\chi 2/d.f. = 1.992$, NFI = 0.844, RMSEA = 0.041 and CFI = 0.853.

Hypothesis H1 is tested to understand the effect of Metacognitive awareness on Gen Z management students' learning adaptability. Metacognitive awareness comprises of four constructs namely thinking process, Cognitive abilities, Knowledge about cognition and Learning abilities. It is found that there is a positive and significant effect of Thinking process on students' learning adaptability (β =3.964, p value=0.043). Hence, H1 is accepted. Similarly, there is a positive and significant effect of Cognitive abilities on students' learning adaptability (β =7.888, p value=0.021), positive and significant effect of Knowledge about Cognition on students' learning adaptability (β =7.065, p value=0.023) and positive and significant effect of Learning abilities on students' learning adaptability (β =4.146, p value=0.041).Hence H1 is accepted.

Hypothesis H2 tries to understand the effect of Metacognitive awareness on Gen Z management students' academic performance. It is found that there is a positive and significant effect of Thinking process on students' Academic performance (β =1.878, p value=0.049). Similarly, there is a positive and significant effect of Cognitive abilities on

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students' academic performance (β =4.316, p value=0.045), positive and significant effect of Knowledge about Cognition on students' academic performance (β =3.971, p value=0.048) and positive and significant effect of Learning abilities on students' academic performance (β =2.498, p value=0.0495). Hence H2 is accepted.

Hypothesis H3 tries to understand the effect of Metacognitive awareness on Gen Z management students' Self-regulation. It is found that there is a positive and significant effect of Thinking process on students' Self-regulation (β =2.836, p value=0.0498). Similarly, there is a positive and significant effect of Cognitive abilities on students' Self-regulation (β =5.419, p value=0.039), positive and significant effect of Knowledge about Cognition on students' Self-regulation (β =4.639, p value=0.041) and positive and significant effect of Learning abilities on students' Self-regulation (β =2.969, p value=0.0497). Hence H3 is accepted.

Hypothesis H4 tries to understand the effect of Metacognitive awareness on Gen Z management students' motivation and engagement. It is found that there is a positive and significant effect of Thinking process on students' motivation and engagement (β =2.831, p value=0.0497). Similarly, there is a positive and significant effect of Cognitive abilities on students' motivation and engagement (β =5.830, p value=0.036), positive and significant effect of Knowledge about Cognition on students' motivation and engagement (β =4.841, p value=0.039) and positive and significant effect of Learning abilities on students' motivation and engagement (β =2.843, p value=0.0498). Hence H4 is accepted.

Hypothesis H5 tries to understand the effect of Metacognitive awareness on Gen Z management students' problem-solving skills. It is found that there is a positive and significant effect of thinking process on students' problem-solving skills. (β =3.739, p value=0.042). Similarly, there is a positive and significant effect of Cognitive abilities on students' problem-solving skills (β =7.455, p value=0.024), positive and significant effect of Knowledge about Cognition on students' problem-solving skills (β =6.587, p value=0.031) and positive and significant effect of Learning abilities on students' problem-solving skills (β =3.821, p value=0.041). Hence H5 is accepted.

The data analysis reveals that metacognitive awareness has a significant positive effect on students' academic performance, learning adaptability, self-regulation, problem-solving skills, motivation, and engagement. Hence all the hypotheses are accepted and the model is validated. This can be concluded from this study that metacognitive awareness helps students become more self-regulated learners. They are better able to set goals, plan their studies and able to maintain their academic performance, they possess better problem-solving skills, they are more motivated and engaged in their learning and their learning adaptability is high.

Limitations of the Study

The sample size was limited to only 270 students. Results can be more trustworthy when the sample size is higher. The sample covers respondents only from Mumbai Metropolitan area including Navi Mumbai. The study can be extended to people from other states and cities.

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