Journal of Law & Social Studies (JLSS)
Volume 5, Issue 2, pp 338-354
www.advancelrf.org

Conceptualization, Development, and Validation of Teachers' Metacognitive Self-Consciousness Questionnaire (TMSQ): A Quantitative Approach

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Abstract

The research focuses on creating and verifying a questionnaire for teachers' metacognitive self-consciousness (TMSQ). The Reliability and validity of the TMSQ were established in this research using a quantitative methodology and a systematic approach to scale development. A preliminary pool of items was created after a detailed and comprehensive literature review and focus group discussion. The items were adapted, modified, and validated regarding content, face, and construct. In order to determine the construct validity of the completed questionnaire, an exploratory factor analysis (EFA) was performed using SPSS version 27. Items of the questionnaire were loaded against two factors, i.e., awareness of thoughts and monitoring of thoughts.CVR and CVI values supported the desired validity. The data were further processed through Smart PLS version 4 for validity, reliability, and model fit. AVE values for the items related to awareness of thoughts were 0.646> 0.5, and for monitoring of thoughts were 0.564> 0.5. Fornell-Lacker criterion value was 0.804,more than the correlations with other latent constructs, i.e., 0.692 and 0.751. The Heterotrait-Monotrait Ratio (HTMT) value was 0.09, equivalent to the acceptable cut value. The values of Cronbach alpha for awareness of thoughts were 0.896> 0.7, and monitoring of thoughts was 0.798 > 0.7. Similarly, the composite Reliability (CR) values were 0.915> 0.7, and 0.863> 0.7, respectively. Thus, the teachers' metacognitive self-consciousness (TMSQ) was internally consistent, valid, and reliable. The findings of the entire study supported using the TMSQ to measure teachers' metacognitive self-consciousness.

Keywords: Metacognitive Self-Consciousness, Validation, Conceptualization, Development

Introduction

People who experience metacognitive self-consciousness are aware of and can keep track of their thoughts. They are conscious of their own beliefs, ideas, and information. It requires more than just being aware of one's ideas; it also requires actively observing and considering one's cognitive processes. It requires being conscious of one's methods and strategies for controlling the effectiveness of their thinking and any biases or presumptions that might affect their thinking (Moshman, 2018).

People who are metacognitive about their thoughts tend to be more introspective, analytical, and self-aware. They have a greater capacity for metacognitive activities, including planning, monitoring, and assessing their learning or problem-solving efforts; better regulate cognitive processes; and adjust tactics as needed. Learning, problem-solving, and decision-making can all benefit from the cultivation of metacognitive awareness. It aids students in becoming better learners by letting them evaluate their progress, pinpoint areas of weakness, and implement methods known to boost retention and recall (Zimmerman & Schunk, 2011).

To sum up, metacognitive self-consciousness is recognizing and controlling one's learning, problem-solving, and decision-making processes for optimal performance. Metacognitive self-consciousness s in the classroom is useful for several reasons: The following are ways in which students can benefit by employing metacognitive self-awareness.

Reflective Practice: Teachers with a high level of metacognitive self-consciousness may evaluate and improve their pedagogical methods, lesson plans, and management approaches. Teachers' ability to reflect on and adapt their practices is directly correlated with the success of their students in the classroom.

Adaptability: By developing their metacognitive self-consciousness, educators can better tailor their lessons to the needs of their students. Teachers can better support their students' learning by monitoring and reflecting on their teaching practices to identify when a certain technique is not working.

Planning and Instructional Decision-Making: Teachers can better organize lessons, create curricula, and choose materials if they understand how they think. They can tailor their teaching to the needs of each student by considering their individual learning objectives, skill levels, and intended outcomes.

Student Assessment: Metacognitively self-conscious Teachers can better create and use exams relevant to students' learning goals and provide reliable data on their development as learners. Teachers in tune with their thought processes can better design tests, quizzes, and quizzes that promote higher-order thinking, evaluate critical thinking, and provide students with constructive feedback.

Modelling Metacognition: Teachers should provide a good example for their students. Inspiring pupils to develop their metacognitive skills, teachers who are self-aware about their thinking and problem-solving practices set a good example. Teachers can guide pupils to greater self-consciousness and academic success by introducing and demonstrating metacognitive practices.

Professional Growth: Metacognitive self-consciousness aids educators in furthering their expertise. Teachers can improve their teaching methods and keep up with the latest educational research and best practices by engaging in reflective practice, soliciting input from colleagues and students, and participating in ongoing professional learning.

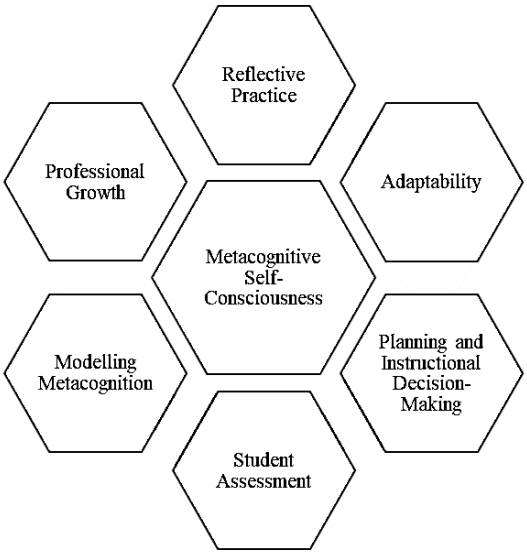


Figure 1: Teachers' Metacognitive Self-Consciousness

Educators benefit from increased metacognitive self-consciousness because it allows them to become reflective practitioners, modify their methods based on student needs, make well-informed judgments about the classroom's instruction, and encourage metacognition among their students. Teachers can improve their impact on students' learning by increasing their knowledge of their thought processes (Alexander & Winne, 2012; Perry & Winne, 2006; Guskey, 2002).

Researchers and academics have been interested in gauging instructors' metacognitive self-consciousness and associated constructs for some time now. The below-mentioned table 1 indicates the use of teachers' use of metacognition in different ways:

Table 1: Use of Metacognition

Schraw, et al. (2006)	Teachers' Metacognitive Awareness of Reading Strategies Inventory (MARSI) was created and tested in this research. The inventory assessed the degree to which educators were cognizant of the importance of metacognitive strategies for teaching reading.
Veenman, et al. (2006)	In order to gauge educators' perspectives on metacognitive reading techniques, this group of researchers created the Metacognitive Knowledge About Reading Strategies (MKRS) questionnaire.
Hasegawa, et al. (2017)	This study assessed Japanese language teachers' metacognitive awareness using the MAIT (Metacognitive Awareness Inventory for Teachers). This questionnaire measured teachers' self-awareness of their metacognitive processes and techniques.
Khurram (2020)	For Pakistan Studies, he investigated how metacognitive teaching influences students' awareness of their thinking processes. Students who were taught with metacognitive pedagogy scored much higher on a test of cognitive self-consciousness than those who were not taught with

	metacognitive pedagogy, as shown in the study.
Petanova and Stoyanova (2016)	Teachers' levels of cognitive self-awareness were correlated with their progress in the field. Teachers' confidence in their abilities as educators (as measured by their self-efficacy) was positively connected with their levels of cognitive self-awareness.
Kikul et al. (2017)	They probed the link between instructors' metacognition and the methods they employ in the classroom. Teachers' use of metacognitive methods like planning, monitoring, and evaluating their learning was positively connected with their cognitive self-awareness.

Reflecting on and understanding one's learning, thinking, and problem-solving processes is "metacognitive self-consciousness" and is essential for effective teaching. It consists of a wide variety of interconnected parts. Among the many aspects that make up metacognitive self-awareness are:

Self-awareness: Self-conscious educators who practice metacognition know their learning styles and limitations. They have a firm grasp of their strengths and weaknesses and pedagogical approaches (Pintrich &Zusho, 2002).

Self-monitoring: Metacognitive teachers are in control of their learning and development. They can monitor their development, single out problem areas, and alter their study techniques accordingly (Schraw &Moshman, 1998).

Self-regulation: Metacognitively self-conscious educators can control their education. They can identify what they want to learn, create a plan to get there, and use ways to learn effectively (Zimmerman, 1998).

Self-efficacy: Self-conscious educators have faith in their intellectual capacities. They view education favorably and are assured of their capacity to absorb new information (Bandura, 1997).

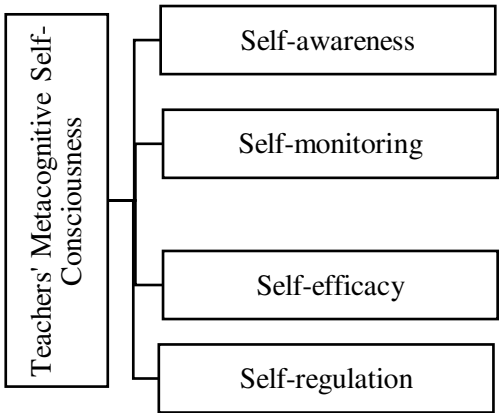


Figure 2: Teachers' Metacognitive Self-Consciousness

These are just some of the components of teachers' metacognitive self-consciousness. By developing these skills, teachers can become more effective learners and educators.

Teachers' Metacognitive Self-Consciousness Questionnaire (TMSQ)

The basic procedure for developing the Teachers' Metacognitive Self-Consciousness Questionnaire (TMSQ) is as follows. However, this approach provides a general framework; the specifics may vary depending on the nature of the questionnaire and the study environment.

Define the Construct

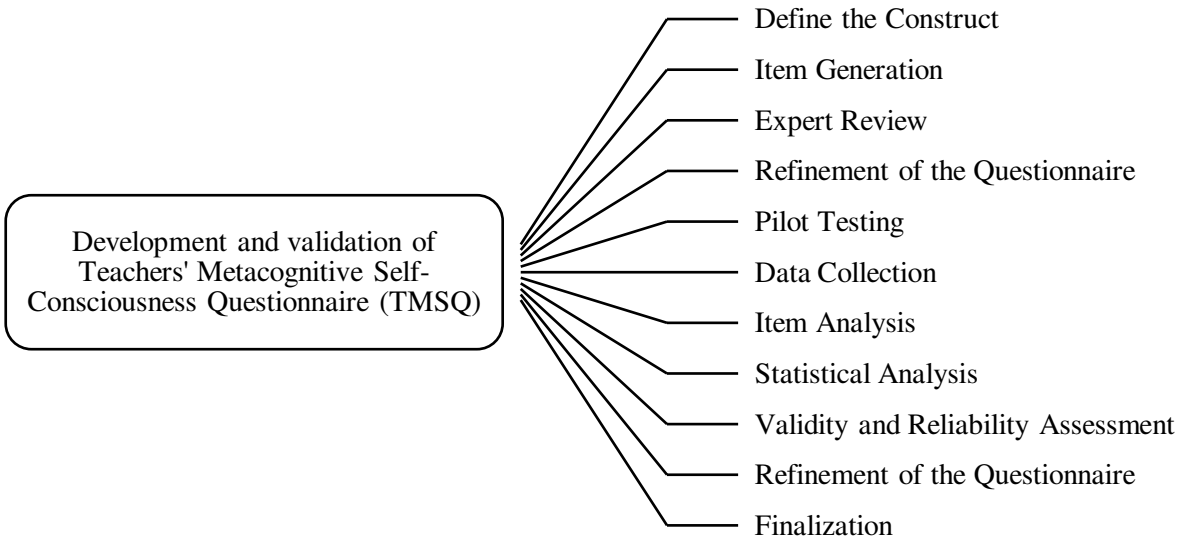


Figure 3: Teachers' Metacognitive Self-Consciousness Questionnaire

The first step is defining the teachers' metacognitive self-consciousness questionnaire (TMSQ) concept. Theoretical groundwork and prior research on the topic can be better understood by reviewing the available literature (Schraw et al., 2006), which has been established above.

Item Generation

Generating a pool of potential items relevant to the construct of teachers' metacognitive self-consciousness is important. These items should reflect different aspects of the construct and be phrased as statements or questions (DeVellis, 2017). Numerous instruments and scales exist to assess teachers' metacognitive self-consciousness. However, the items of the tool were adapted from a PhD dissertation (Khurram, 2021). Items were revised and reorganized to better fit the needs of (TMSQ). Sixteen (16) items relating to school-related awareness and monitoring were included in the first version of this questionnaire (TMSQ). It was based on the 5-point Liker scale, which includes "almost often," "often," "sometimes," "rarely," and "never." The questionnaire items were rephrased and clarified to make them more accessible to the study's respondents.

Expert Review

After developing possible items, getting feedback from experts in metacognition and education on how relevant and clear those items are is important. Experts gave feedback on the questions and whether or not they were valid. (Vallerand, 2015). The expert review helped establish the face validity of the Teachers' metacognitive self-consciousness questionnaire (TMSQ). Peers from the Department of Education, a Clinical Psychologist, and a Professor of Psychology from the University of Education in Lahore discussed the first draft. The preliminary draft was improved after a detailed discussion with the focus group. Based on the results of the expert opinion, the first

draft was altered on all factors, sub-factors, and questionnaire items. This first draft was sent to experts in education and psychology who work at local and global universities in Pakistan and other countries; and desired to give their opinions on whether the language was plausible, how the factors, sub-factors, and individual items fit together, whether the factors, sub-factors, and individual items were appropriate, and whether they were clear and made sense. The hard copy of the draft was given to the Department of Education and the Department of Psychology staff at different universities. This teachers' metacognitive self-consciousness questionnaire (TMSQ) was sent to experts in metacognition via Google Forms, LinkedIn, and email. The expert analysis provided face validity and content validity.

First Refinement of the Questionnaire

Based on the results of the analysis and feedback from the experts, the questionnaire was refined by removing and modifying problematic items. The revised questionnaire was ensured to adequately capture the validity (Clark & Watson, 2019).

Pilot Testing

The questionnaire was administered to a sample of teachers to gather preliminary data. Pilot testing helped identify issues with item clarity, response format, or other potential problems. Researchers analyzed the pilot-tested data to assess the reliability of the questionnaire based on Cronbach's alpha (Taber, 2018). A questionnaire pilot was tested with 148 public secondary school teachers. Participants in the pilot testing were left out of the actual sample of the study. The respondents for the pilot test were selected according to the citation of Khurram (2021), which indicates that 10 to 15 respondents per item are mandatory for a pilot study.

Data Collection, Item Analysis and Statistical Analysis

After the questionnaire was administered to a sample of teachers to gather preliminary data, the responses were collected and entered into relevant statistical software. The pilot data were further analyzed to examine the statistical properties of the items. The items were removed or revised for the poorly performing or exhibiting ambiguous wording (Sijtsma, 2009). Statistical software SPSS version 27, PLS-Smart Version 4, and Excel version 2019 were used for item analysis.

Statistical analyses were conducted to examine the questionnaire's psychometric properties, including assessing internal consistency (e.g., Cronbach's alpha), factor structure (e.g., exploratory factor analysis), and convergent or discriminate validity by examining relationships with other relevant constructs (Brown, 2015). Further, the construct validity of the teachers' metacognitive self-consciousness questionnaire was ensured (Clark & Watson, 2019). Similarly, the discriminate validity of the scale was also ensured. Results ensured the Factor Analysis. Exploratory Factor Analysis (EFA) is usually used to determine how the observed variables fit together without imposing an existing structure. Exploratory factor analysis (EFA) was done using Principal Component Analysis, Extraction Method, and Varimax with Kaiser Normalization Rotation Method with SPSS version 24. Table 5 shows the factors on which each item on the teachers' metacognitive self-consciousness questionnaire (TMSQ) is based. In this table, factor loadings of 0.50 or more are shown. With this rule, only the items in a tool with a factor loading of at least 0.50 on their scale and less than 0.50 on all other scales are kept. Because of this criterion, some items on the teachers' metacognitive self-consciousness questionnaire had to be removed (TMSQ).

Validity and Reliability Assessment

The validity of the questionnaire was evaluated by examining its relationship with external variables related to metacognitive self-consciousness. This process involved exploring correlations with other established measures of metacognition or educational outcomes (American Psychological Association & National Council on Measurement in Education, 2014).

Face Validity, Content Validity, and Construct Validity

For validating the Teachers' Metacognitive Self-Consciousness Questionnaire (TMSQ), face validity, Content validity, Construct validity, and reliability were ensured (Khurram, 2021). The term "face validity" is used to describe how well a questionnaire "appears" to measure the construct(s) it is designed to assess. The experts or future respondents make an initial, unofficial evaluation of the questionnaire's items. Each questionnaire item was written to ensure its intended audience would have no trouble understanding it. Items ambiguous or difficult to understand may cause incorrect interpretations or biased answers. Expert Review was used to evaluate the clarity of the questionnaire items by having experts in the field (including item developers and researchers) review the items and provide feedback (DeVellis, 2016). However, face validity is subjective and does not offer substantial evidence of the validity of the questionnaire. Experts in the field of metacognition reviewed the Teachers' metacognitive self-consciousness questionnaire (TMSQ) to ensure that it adequately measures metacognitive self-awareness, a key component of test validity.

The teachers' metacognitive self-consciousness questionnaire (TMSQ) has been made construct valid; thus, it should be able to measure the intended constructs. Factor analysis was used to do this. The items' construct validity was established by verifying their applicability to the construct under investigation. The theoretical basis and research aim informed the design of every experiment aspect. Items were examined to ensure they adequately measure the target construct (DeVellis, 2016; Hinkin, 1998).

Similarly, the Teachers' Metacognitive Self-Consciousness Questionnaire (TMSQ) was also tested for "reliability," which indicates that it should generate consistent findings over time. This process of validation was accomplished through the data gathered by pilot testing.

Table 2: CVR Values of items of TMSQ

Items	CVR	Status	Decision
AT1	0.88	Acceptable	Retained
AT2	0.76	Acceptable	Retained
AT3	0.88	Acceptable	Retained
AT4	0.76	Acceptable	Retained
AT5	0.76	Acceptable	Retained

AT6	0.88	Acceptable	Retained
AT7	0.41	Not Acceptable	To be revised/ Removed
AT8	0.29	Not Acceptable	To be revised/ Removed
AT9	0.41	Not Acceptable	To be revised/ Removed
MT1	0.88	Acceptable	Retained
MT2	0.88	Acceptable	Retained
MT3	0.88	Acceptable	Retained
MT4	0.88	Acceptable	Retained
MT5	0.88	Acceptable	Retained
MT6	0.29	Not Acceptable	To be revised/ Removed
MT7	0.41	Not Acceptable	To be revised/ Removed

To improve the questionnaire's quality and ensure validity, a content validity ratio (CVR) was calculated for each item, and a content validity index (CVI) was calculated. The teachers' metacognitive self-consciousness questionnaire (TMSQ) was changed based on what the experts said. Experts said the statement should change its wording, language, and plausibility. Seventeen experts provided their valuable opinion, and the CVR was computed accordingly. All the items remain valid regarding CVR since their computed values remained greater than the cut value for twelve experts (i.e., 0.49). Thus, three items from the first and two from the second factor were removed. The Content Validity Ratio (CVR) values of the retained items ranged from 0.53 to 0.88, and the overall Content Validity Index (CVI) of the questionnaire stayed at 0.85 >0.8. If the CVR value is more than 0.49, it remains acceptable. Thus, items AT7, AT8, AT9, MT6, and MT7 were observed as weak, and their status was either to be revised/ removed.

The below-mentioned Graph 1 indicates the pictorial evidence of the CVR of each item of the teachers' metacognitive self-consciousness questionnaire (TMSQ). This graph indicates that five items from the questionnaire fall below the cut value.

Graph 1: CVR Values of items of TMSQ

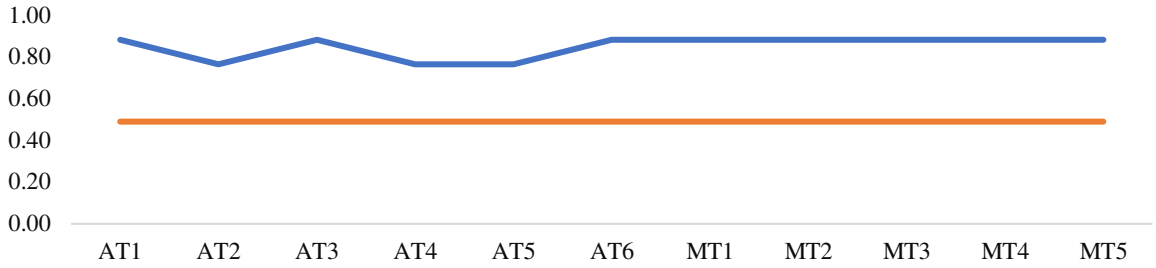
Therefore, the weak items, AT7, AT8, AT9, MT6, and MT7, were removed from the teachers' metacognitive self-consciousness questionnaire (TMSQ) since their observed values were below the threshold value, i.e., 049.

Table 3: CVR Values of Revised Items of TMSQ

Items	CVR	Status	Decision
AT1	0.88	Acceptable	Retained
AT2	0.76	Acceptable	Retained
AT3	0.88	Acceptable	Retained
AT4	0.76	Acceptable	Retained
AT5	0.76	Acceptable	Retained
AT6	0.88	Acceptable	Retained
MT1	0.88	Acceptable	Retained
MT2	0.88	Acceptable	Retained
MT3	0.88	Acceptable	Retained
MT4	0.88	Acceptable	Retained
MT5	0.88	Acceptable	Retained

After removing the weak items, the final teachers' metacognitive self-consciousness questionnaire (TMSQ) comprised eleven items, out of which six items were about awareness of thoughts and five items about monitoring of thoughts.

Graph 2: CVR Values of Revised Items of TMSQ



Graph 2 indicates the pictorial evidence of the CVR of each item of the teachers' metacognitive self-consciousness questionnaire (TMSQ) that none of the items from the questionnaire fall below the cut value. Thus, these items were retained in the questionnaire.

The factor structure in terms ofindicator reliabilitywas ensured through PLS-smart version 4.KMO and Bartlett's Test were measured on all the teachers' metacognitive self-consciousness questionnaire (TMSQ) items.

Table 4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.737
Bartlett's Test of Sphericity	Approx. Chi-Square	1234.09
	df	55
	Sig.	<.001

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy value remained at .737, higher than the acceptable value,i.e., 0.7. Similarly, the significance level for Bartlett's Test of Sphericity is p<.001.

Model Fit of Teachers' Metacognitive Self-Consciousness Questionnaire (TMSQ)

Model fit of the teachers' metacognitive self-consciousness questionnaire (TMSQ) encompasses measurement model evaluation and structural model evaluation. Measurement model evaluation is further subdivided into (a) indicator reliability, (b) internal consistency reliability, (c) convergent validity, and (d) discriminant validity, whereas structural model evaluation is subdivided into (a) coefficient of determination (R^2) (b) path coefficients and significance (c) effect size (f^2) and (d) goodness-of-fit (GoF) evaluation.

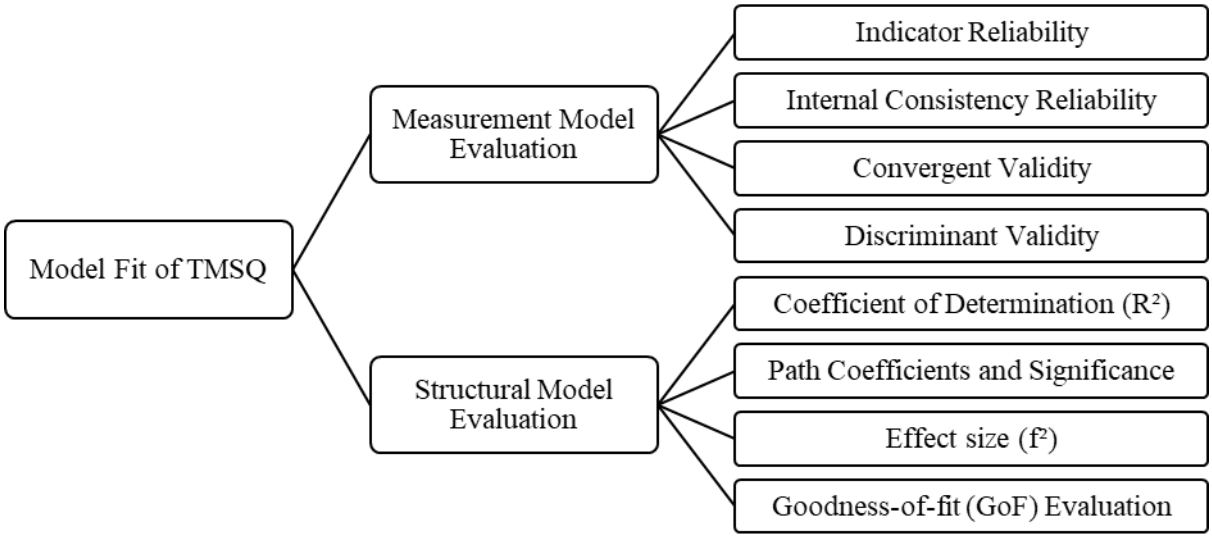


Figure 4: Hierarchy of Model Fit of Teachers' Metacognitive Self-Consciousness

Measurement Model Evaluation

Measurement Model Evaluationrefers to how closely the proposed theoretical model, or the questionnaire's latent structure, corresponds with the obtained data. It calculates the difference between the observed and expected covariance matrices. Researchers used numerous fit indices to test model fit for the teachers' metacognitive self-consciousness questionnaire (TMSQ).

Indicator Reliability

Hair et al. (2021) reported that an item loading should be 0.7 or higher for a reflective measurement model; however, If the loading is very close to 0.7 (for example, 0.68 or 0.69), and the construct's overall reliability and validity are satisfactory, some researchers might decide to keep the item, especially if it has significant theoretical or practical importance. Furthermore, If the loading is well below 0.7, particularly below 0.4, it is common to remove the item from the model, as it might not reliably represent the latent construct.

The links between the observed variables and the underlying hidden factors are shown through factor loadings in EFA. They can be between -1 and +1. If the variable's loading is close to 1, it has a significant positive relationship with the factor. On the other hand, a loading that approaches -1 denotes a significant negative association. If the loading is close to 0, the variable has little bearing on the factor. According to Khurram et al. (2020), items should only be kept from a questionnaire if they have a factor loading of at least 0.50 on the appropriate scale. The factor loading values obtained through PLS-Smart version 4 are shown in the below-mentioned table.

Table 5: Factor Loading

Items	Awareness of Thoughts	Monitoring of Thoughts
AT1	0.89	

AT2	0.83	
AT3	0.81	
AT4	0.67	
AT5	0.89	
AT6	0.72	
MT1		0.62
MT2		0.74
MT3		0.62
MT4		0.87
MT5		0.87

All factor loadings in the table exceed the cutoff value of 0.5, as expected. As a result, the teachers' metacognitive self-consciousness questionnaire (TMSQ) component is extremely positively loaded across all dimensions. Items in an instrument are considered to meet this requirement if their factor loading is greater than 0.5 on their scale and less than 0.50 on all other scales. Thus, none of the items from the questionnaire were to be removed.

Internal Consistency Reliability

The constructs' Composite Reliability (CR) values determine the internal consistency reliability. The composite reliability (CR) values for awareness of thoughts were 0.915 > 0.7, and monitoring of thoughts was 0.863 > 0.7, respectively.

Convergent Validity

Each construct's average variance extracted (AVE) value determines the convergent validity. 0.5 or higher than this is the threshold value. The values of convergent validity for awareness of thoughts were 0.646 > 0.5, and monitoring of thoughts was 0.564 > 0.5, respectively.

Discriminant Validity

The value of the Fornell-Larcker Criterion and the Heterotrait-Monotrait Ratio (HTMT determine the discriminant validity. For the Fornell-Larcker Criterion, the square root of the AVE of each construct should be higher than its highest correlation with any other construct. For HTMT, a

common threshold is less than 0.85 or 0.90. The observed value of HTMT for the questionnaire remained at 0.091 < 0.9, which is acceptable.

Table 6: Measurement Model Evaluation of TMSQ

Indicators	Index Value	Criterion Value
Indicator Reliability	Ranged between 0.62-0.89	• A value greater than 0.5 is acceptable • A value below 0.4 is removable • A value of 0.7 or higher is recommended
Internal Consistency Reliability	AT = 0.915 MT = 0.863	0.7
Convergent Validity	AT = 0.646 MT = 0.564	0.5
Discriminant Validity	0.091	• Less than 0.85 or 0.90

Structural Model Evaluation

The second step in SEM evaluation is structural model evaluation after measurement model validation. This stage examines the theoretical model's latent variables (or constructs). It entails taking critical steps.

Coefficient of Determination (R^2), Effect size (f^2), Path Coefficients and Significance

The R^2 value remained at 0.25, acceptable according to Cohen's (1988) suggestions. The path coefficient was observed as 0.043, indicating a relationship between variables. The effect size (f^2) statistic compares the relative impact of predictors in the model by measuring the change in R^2 that occurs when a specified predictor is included in the model. Effect sizes can be interpreted using Cohen's (1988) guidelines, commonly used in PLS-SEM and other statistical contexts: f^2 of 0.02 represents a small effect, f^2 of 0.15 represents a medium effect, and f^2 of 0.35 represents a large effect (Kline, 2023; Hair et al., 2021; Cohen, 1988). The observed value f^2 remained at 0.085, indicating a small effect.

Goodness-of-fit (GoF) Evaluation

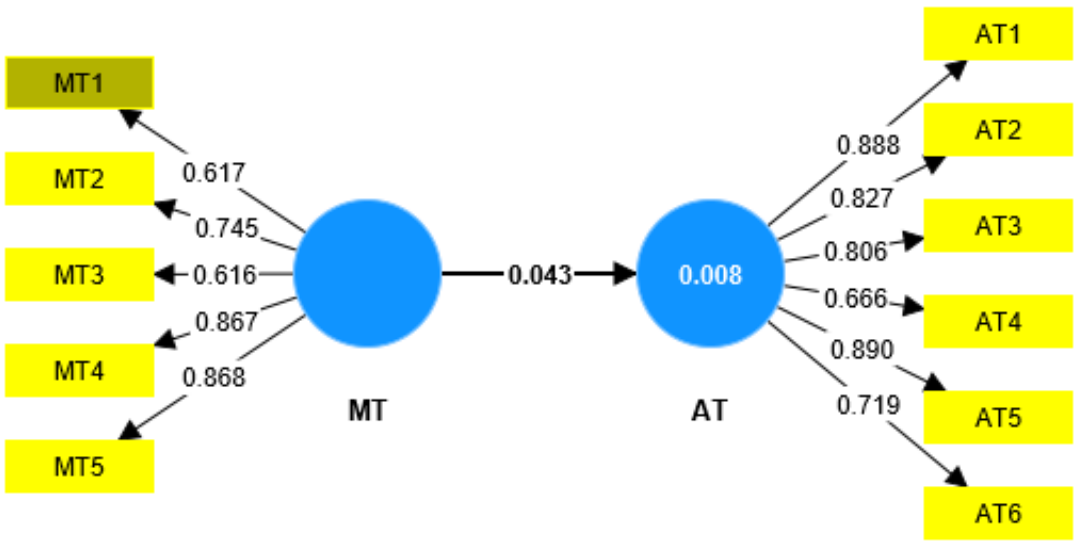
Using the Standardized Root Mean Square Residual (SRMR) as a measure of goodness-of-fit is a recent development in applying PLS-SEM. The square root of the difference between the residuals of the observed and predicted correlation matrices is SRMR. An SRMR value of less than 0.08 is considered a good fit, indicating a small average deviation between observed and predicted correlations (Hair et al., 2021; Henseler et al., 2009; Cohen, 1988). The SRMR value remained 0.076 < 0.08, indicating its good fit.

Table 6: Structural Model Evaluation of TMSQ

Indicators	Index Value	Criterion Value
Coefficient of Determination (R^2)	0.25	• R^2 of 0.25 (or 25%) is weak, • R^2 of 0.50 (or 50%) is moderate • R^2 of 0.75 (or 75%) is substantial or strong
Path Coefficients and Significance	0.043	• p-value less than 0.05
Effect size (f^2)	0.085	• 0.02 small effect • 0.15 medium effect • 0.35 large effect
Goodness-of-fit (GoF) Evaluation	0.076	• 0.08

Model Fit ofTeachers' Metacognitive Self-Consciousness Questionnaire (TMSQ)

The factor structure of teachers' metacognitive self-consciousness questionnaire (TMSQ) was ensured using PLS-Smart version 4, illustrated in the figure below.



The figure indicates that items were loaded into two unique sub-factors, i.e., awareness of thoughts and monitoring of thoughts. The awareness of thoughts subfactor had six (6) items loaded against it, but the monitoring of thoughts subfactor had just five (5) items put against it.

Refinement and Finalization of Teachers' Metacognitive Self-Consciousness Questionnaire (TMSQ)

Based on the item analysis results and feedback from the pilot study, none of the items were removed from the questionnaire, and based on the statistical analyses and validity assessment results, finalized the questionnaire by removing any remaining problematic items and confirming its reliability and validity. Thus, the teachers' metacognitive self-consciousness questionnaire (TMSQ) had two factors: awareness of thoughts and monitoring of thoughts. Six (6) items were loaded against awareness of thoughts, and five (5) items were loaded against monitoring of thoughts.

Conclusions and Recommendations

The current study successfully developed and validated a tool for measuring teachers' metacognitive self-consciousness: the questionnaire for teachers' metacognitive self-consciousness (TMSQ). Through rigorous quantitative analysis and a systematic approach to scale development, the results confirm the TMSQ's reliability and validity. The TMSQ items had a two-factor structure (i.e., awareness of thoughts; monitoring of thoughts). Both factors demonstrated acceptable construct validity values.

The TMSQ also demonstrated strong internal consistency, with Cronbach alpha and Composite Reliability (CR) values that exceeded the desired threshold. The discriminant validity of the scale was confirmed by the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT). These findings support the TMSQ as a reliable and valid tool for assessing teachers' metacognitive self-consciousness.

As a result, the TMSQ is recommended for use in various research and educational contexts. Its application extends to teacher training programmes, professional development initiatives, and academic research, with the potential to significantly contribute to our understanding and enhancement of teachers' metacognitive skills. Finally, the current study adds to the field of metacognitive research by providing a well-designed, reliable, and valid tool. The teachers' metacognitive self-consciousness questionnaire (TMSQ) fills a gap in the literature and suggests future research directions.

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