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Construction of Metacognitive Thinking Scale (MTS)

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ABSTRACT

The present paper deals with the construction of a Metacognitive Thinking Scale (MTS) in order to measure the higher order of cognitive patterns among adolescents. All the dimensions of metacognitive thinking, selection of the items and the whole processing of the scale till its final form are discussed in detail. The scale is checked for its internal consistency and on the basis of this it was found that the content validity and face validity of the scale is high. Split-half reliability was calculated to be 0.87.

INTRODUCTION

Metacognition refers to 'thinking about thinking' (Jost, Kruglanski, & Nelson, 1998) and has been defined to be "the ability to reflect upon, understand, and control one's learning" (Schraw & Dennison, 1994). Two critical components of metacognition are included in its definition. First, there is knowledge about cognition; and second, there is knowledge about the regulation of cognition. Metacognition thus includes both an awareness of cognition and an understanding of strategies to change cognitions. Analytic thinking, unlike intuition, is

accessible to consciousness. One way to improve analytic thinking is to become more aware of the thought process itself so it can be modified or improved. Verplanken et al. (2007) investigated negative self-thinking as a mental habit and supported the assumption that metacognitive reflection on negative self-thinking as mental habit may play an important role in self-evaluative processes. That is an assumption that underlies modern work on metacognition. The word metacognition means higher level cognition and refers to thinking about the thought process itself. To the extent one can monitor his own thoughts, one might be able to change and improve the way our thought processes operate. Metacognitive Thinking Scale was prepared by researcher to find out the cognitive patterns of adolescents. Ayalon et al. (2007)evaluated the role of cognitive functioning and other clinical and demographic characteristics as potential predictors of suicidal ideation in older primary care patients and found that having poorer cognitive functioning, poorer health, and greater mental distress were associated with passive suicidal ideation.An adolescent's metacognitive thinking is badly affected when they have suicidal ideations. They may negatively affect their ability to perform well; consequently, they experience depression and disappointment. Coutinho (2008) examined the relationships among self-efficacy, metacognition, and performance and suggested that students with effective metacognitive strategies also have strong belief in their capabilities to successfully perform a task. The following issues were considered while constructing a test for detecting adolescent's psychological problems. After reviewing the relevant literature and discussing with experts, it was noticed that there was no such scale available which will fulfil the purpose of the present study. Therefore for the present research work, the investigator tried to construct this scale, called 'Metacognitive Thinking Scale'. This scale has eight sub-parts. Each part measures separate metacognitive thinking dimensions. This scale is useful for the age group of 15 to 25 years of adolescents.

Before collecting the items a rough layout was made regarding the major metacognitive thinking dimensions. The dimensions that are important indicators for this variable are as follows:

Self-evaluation (Section-1)
Self-awareness (Section-2)
Self-efficacy **(**Section-3)
Resourcefulness (Section-4)
Self-monitoring (Section-5)

Self-motivation (Section-6)

Self-control (Section-7)

Attribution (Section-8)

These were the factors which were found to have a direct concern with metacognitive thinking and which were, taking into account their relative emphases, required to be measured, given to each factor. Both metacognition and reflection are considered in educational psychology texts to be concerned with the process of monitoring, regulating and controlling an individual's thinking about their thinking (Daniels, 2002). According to Livingston (1977) metacognitive strategies are sequential processes that one uses to control cognitive activities, and to ensure that a cognitive goal (e.g., understanding a text) has been met. This was done to indicate the number and weightage of items to be included in each section of the scale. Each section consists of items related to one dimension. Hence, there are total 8 sections in the scale. These indicators were taken as a guideline for writing items.

First draft of the scale

In order to make a good test the items were skillfully written and ambiguous statements were avoided to cover all the major dimensions of metacognition. While writing items help was taken from scales on the above given dimensions and experts were consulted to solve the purpose. Thus a large number of items were prepared.

In the first write up of the metacognitive thinking scale total 8 sections were included in the scale, each section consisted of items related to eight dimensions of metacognition i.e self-evaluation, self-awareness, self-efficacy, resourcefulness, self-monitoring, self-motivation, self-control, self-control and attribution. Initially the numbers of items prepared for section-1 (self-evaluation) were 106. These items inquired about the knowledge of one's own strength and weaknesses. (e.g. I am able to enjoy taking calculated risks. I change directions because I lack the confidence in myself to stick to one direction).

The second section of the scale measuring another dimension of metacognition i.e self-awareness was prepared. 65 items were selected from different sources in order to determine the level of awareness of adolescents, for more the self awareness better the metacognition.

Another important dimension of metacognitive thinking is self-efficacy. Thus 39 items for section 3 were selected as to determine people's beliefs about their capabilities to produce

designated levels of performance. (e.g. I am able to expand my intelligence by learning something new every day. I am able to constantly question my own decisions and judgments).

As Resourcefulness forms an important part of the metacognition about 42 items were taken, (e.g. I create my own examples to make information more meaningful. I change strategies when I fail to understand).

Section-5 & 6 included self-monitoring (24 items) and self-motivation (81 items) dimensions of metacognition respectively which talk about the monitoring competence or emotional self-regulation and an ability to motivate oneself without the need of being influenced to do so by another person.

The last two sections (section 7 & 8) consisted of self-control (measuring an ability of a person to exert their will over the inhibitions of their body or self) and attribution (ascribing of something as the cause or effect of another) dimensions of metacognition. Section 7 had 69 items & section 8 had 48 items.

Pilot study

A pilot study was done by administering the scale to a small group of adolescents. Certain defects were found in the scale, so the investigator planned to rewrite the statements. The statements which were felt to be unnecessarily long which could confuse the person and found to be ambiguous and vague were modified. The statements were shortened and pin pointed to avoid any ambiguity. Another change was the reductions of the numbers of the statements because it was felt that some of the statements were not going with the options given for each dimension or section. Another drawback was that the answers (options) were not in a uniform pattern. This time the options were written along with the statements and the scores were assigned to each option. Some of the statements were discarded because it was felt that those statements did not have direct relation to the metacognitive thoughts of adolescents. Apart from this the scale was divided into 8 sections for convenience sake. Rest of the contents was same as in the item selection. The pilot study was done on a group of 20 adolescents on the basis of which language of the instructions were improved.

The second draft of the scale

This was the crucial phase of test drafting as most of the editing work was done in this stage. Major changes were concerned with the modification of the language of the statements that were difficult to understand. Few statements which did not convey the clear idea were rewritten with the help of the experts. Length of the items was reduced as it was hindering the clarity of statements. For e.g. item no. 50 of section 6 (self-motivation) "I am able to feel a fiery passion about life and my career and usually wake up excited about the day ahead" were made short by replacing it with "I feel passionate about my life & career and remain excited about the day ahead". Another amendment was made in the response options which were adjusted according to numerals assigned to them. The major work done was the formation of scoring key for the answers to give objectivity to the scale. The option that was most appropriate to the statement was given a high score and that was less appropriate was given a low score. The scores given for positive statements were 1,2,3,4,5 and scores were reversed for negative statements (5,4,3,2,1). It was decided that higher the score more the metacognition and vice-versa. Thus, the scale was written properly and finally drafted. The expert was given the scale for a try-out. After the test was recommended by the expert it was typed and many duplicate copies were formed for a try out.

The first and second try out

A sample of 80 adolescent's age ranging from 15-19 was taken. The scale was distributed among the adolescents and then collected for further scoring purpose. It was noticed that some statements were not going with the response options given. Thus the language of such statements was modified according to the options. Moreover items that were left blank by adolescents as they were not able to get the meaning of the statements right, were removed from the scale. Apart from it instructions were made clearer and a time-limit was set to complete the scale. After these alterations scale was prepared for a second try-out. For the second try-out items for each section were reduced to 46, 39, 31, 30, 19, 43, 40, and 36 respectively.

Second try-out was done on a sample of 100 adolescents age ranging from 15 -25 years. No such modifications were needed in the second try-out, therefore item analysis was done to find out the internal consistency of the scale (as shown in tables 1-8)

The Final Draft

After all the omissions and corrections the final form of the Metacognitive Thinking Scale (MTS) consisted of 8 sections, Each section has 10 items. The total time taken to fill the scale was questionnaire was also fixed. It was stated that only 30 minutes are required to fill the questionnaire.

Reliability and validity

For a test to be good it must be reliable and valid. Split-half reliability was calculated for this scale with the help of spearman brown formula. A sample of 400 teenagers filled the questionnaire and then items of the scale were divided into two parts. One part consisted of odd items n other part consisted of even items. Split-half reliability score is .87 which shows high reliability of the scale.

As the scale was checked for its internal consistency, it can be stated that the content validity and face validity of the scale is high. Factorial validity was also calculated to know the loading of each factor or dimension of metacognition.

Communalities

	Initial	Extraction
Self Evaluation	1.000	.572
Self Awareness	1.000	.638
Self Efficacy	1.000	.737
Resourcefulness	1.000	.733
Self Monitoring	1.000	.950
Self Motivatuion	1.000	.750
Self Control	1.000	.547
Attribution	1.000	.660

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
Self Evaluation	.720	-.232
Self Awareness	.791	-.112
Self Efficacy	.850	-.125
Resourcefulness	.851	.099
Self Monitoring	.175	.959
Self Motivatuion	.861	.095
Self Control	.734	-.089
Attribution	.804	.117

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
Self Evaluation	.744	-.136
Self Awareness	.799	-.008
Self Efficacy	.859	-.012
Resourcefulness	.830	.209
Self Monitoring	.048	.974
Self Motivatuion	.841	.207
Self Control	.739	.008
Attribution	.782	.221

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.991	.131
2	-.131	.991

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

The scale was finally ready to discriminate between the metacognitive thinking of adolescents. The 400 copies of this final scale were prepared for use with the present research work.

REFERENCES:

Ayalon L., Mackin S., Arean P A., Hongtu C., Mcdonelherr E C. (2007). The role of cognitive functioning and distress in suicidal ideation in older adults, Journal of the American Geriatrics Society, 55, (7), 1090-1094.

Coutinho, S. (2008).Self-efficacy, metacognition, and performance**,** North American Journal of Psychology, http://findarticles.com/p/articles/mi_6894/is_1_10/ai_n28518811/

Dennis Daniels (2002). Metacognition and Reflection, Page written in the context of teacher preparation coursework. HTML, retrieved 16:51, 3 July 2006 (MEST).

Jost, J. T., Kruglanski, A. W., & Nelson, T. O. (1998). "Social Metacognition: An Expansionist Review." Personality and Social Psychology Review, 2(2), 137-154.

Livingston, Jennifer A. (1977), Metacognition: An Overview HTML (retrieved 12:53, 24 May 2006 (MEST)).

Schraw, G., & Dennison, R. S. (1994)."Assessing Metacognitive Awareness." Contemporary Educational Psychology, 19(4), 460-475.

Verplanken, B., Friborg, O., Wang, C. E., Trafimow, D.&Woolf, K.(2007). Mental Habits: Metacognitive Reflection on Negative Self-Thinking. *Journal of Personality and Social Psychology. 92* (3), 526-541.