International Journal of Humanities and Social Science Invention (IJHSSI)
ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714
www.ijhssi.org ||Volume 7 Issue 06 Ver. IV ||Jun. 2018 || PP.81-85

Attitude towards Neural Basis of Thinking about Thinking: Development and Standardization of Neurocognitive Attitude Scale

Sridhar R[(1*)], Pandia Vadivu P[(2)] And Sundararasan T[(3)]
*1-Ph.D Scholar, School of Education, **TAMIL NADU OPEN UNIVERSITY**, Chennai, Tamilnadu, India*
*2-Assistant Professor (Senior), School of Education, **TAMIL NADU OPEN UNIVERSITY***
Chennai, Tamilnadu, India
*3- Ph.D Scholar, Department of Education, **ALAGAPPA UNIVERSITY**, Karaikudi, Tamilnadu*
**Corresponding Author: Sridhar.R*

ABSTRACT: *The essential objective of the present examination was to build and institutionalize a Neurocognitive Attitude Scale (NAS) for the science understudies in optional level. The underlying draft of NAS was comprised of 16 neurostatements, of which thirteen things were positive and staying three things were negative. The neurostatements were readied in light of the fundamental life structures, basic anatomy of the brain, structure and function of the brain, data preparing in the human mind, standards of neuroscience and part of neurocognitive learning methodology in training. An aggregate of 106 respondents were taken an interest in this investigation and having a place with five distinct schools of Chennai and Thiruvallur locale of Tamilnadu, India in this pilot study. The gathered information was transferred in Microsoft excel spreadsheet 97-2013 exercise manual for factual investigation. This scale was institutionalized by utilizing Cronbach Alpha method. The reliability, inter-item correlation and covariance matrices, item-total and scale statistical tests were performed with the help of SPSS programming. After thing investigation 15 neurostatements with more than 0.7 were chosen for the final study. The recently built scales have face, content and construct validity. The reliability coefficient was found 0.699. Our investigation revealed that the perspective towards neurocognition to the understudies in progressing neural premise of thinking towards learning and strong in their creative methodology for learning and change in scholastics.*

KEYWORDS*: Attitude, Neurocognitive, secondary school students, scale, neural*

Date of Submission: 22-06-2018 Date of acceptance: 07-07-2018

I. BACKGROUND TO THE RESEARCH

Brain based learning strategy, concept-centered teaching, reflective thinking, constructivism, problem solving, reasoning ability and other forms of emerging advanced theories of learning are recently used in the classroom instructional transaction between the learners and the facilitator to enhance teaching-learning processes much more effectively. The process of cognition associated to one or more specific areas of the brain is referred as Neurocognition. It involves complex coding and encoding processes and is highly interconnected with neural pathways in the human brain. The basic anatomy and functions of brain and learning process are the two important aspects in Neurocognition. According to Schmidt *et al.* Neurocognition is defined as *"a constellation of cognitive processes such as the linking and appraising of information and incorporates speed of processing, attention, verbal and visual learning, problem solving, working memory and reasoning abilities [1]."*

The Neuroeducational science as an interdisciplinary subject [2]. The educational neuroscience is an emerging and interdisciplinary field which associated with education, psychology and neuroscience respectively. The approaches of neuroscience can inculcate the following aspects among the learners,

a) To develop concrete knowledge in subjects
b) To sharp the understanding level of the concept and
c) To increase the long term memory

II. REVIEW OF RELATED LITERATURE

Ananda Kumar & Chellamani (2016) reviewed a trend analysis on educational research on Neurocognitive perspective. The educational research on neurocognition from the year 2006 to 2015 was analyzed of which, four experimental studies, ten surveys, and two interviews were analyzed. This review was insightful to find out the knowledge of neurocognition and application in classroom practices among teacher community [3].

Sasikumar, Parimala Fathima & Mohan (2016) examined the effect of neurocognitive intervention strategies on enchaining teaching competency in pre-service graduate teacher trainees. In this retrospective study, the investigator selected eight strategies (sensory association, information sequencing, visual recognition, auditory monitoring, scaffolding and decoding, emotional regulation, cognitive association and cognitive verbal articulation) on the concept of neurocognition. The single group pre-assessment treatment post- assessment design was followed in this experimental study. Overall the result revealed that the influence of Neurocognitive intervention strategies is found to be effective in enhancing competence in teaching science [4].

Sridhar, Pandia Vadivu & Chandrakantha (2015) organized a study related to "*Modern Method of Teaching and Learning through Neurocognition: An Innovative Brain Based Strategy for Teachers and Learners*". The authors attempted to explore the recent approaches in teaching and learning process through Neurocognitive based teaching and learning and also discusses the significance of various types of nerve cell coordination in the process of learning and impact of the biology of learning through neurocognition. The neuronal network is a connection of many nerve cells. Neurocognition in education in mainly associated with one or more specific areas of the human brain with respect to the process of cognition in learning. Overall the thematic paper concluded that the futurological aspects of the application of recent strategy using biology of learning through neurocognition [5].

Mridula (2015) in her Ph.D. study titled to "*Effectiveness of neurolinguistic intervention strategy on fostering reflective thinking and writing competence in English among secondary school students*" invented the neurolinguistic intervention strategy to enhance reflective thinking and writing competency in English. The investigator adopted the pre-test-post-test design for the secondary school students using convenient sampling technique. Each control and the experimental group consisted of 35 students. The correlated 't' values (12.763) and (10.816) of Pre-test and Post-test scores experimental group for Reflective Thinking in Writing English and Writing Competence in English is highly significant. The result of the study shows that the strategy enabled to develop a thinking culture in learners [6].

Pandia Vadivu & Sridhar (2014) conducted an innovative experimental study to examine the effectiveness of Neurocognitive Based Concept Mapping (NBCM) on students learning in a science course. A total of 32 students belonging to the ninth grade of the Central Board of Secondary Education (CBSE) School. The investigators adopted pretest-posttest experimental design to conduct their study. The control group was taught through routine conventional lecture method whereas the experimental group was instructed various strategies and steps used in neurocognitive based concept mapping. The findings revealed that the extremely statistically significant between pretest and posttest at 0.01 level of significance. Hence neurocognitive based concept mapping enhance the students memory power. This strategy can be implemented to various level of subjects as well as students [7].

In the Ph.D. study by **Ananthi (2009)** "*the role of neurocognitive therapy in facilitating teaching competence in science education among D.T.E students*" examined among 45 teacher trainees using Competency in teaching science. The researcher adopted pre-test-post-test experimental design to study the role of neurocognitive therapy. The result revealed that the significant mean difference between pre-assessment and post-assessment scores of the student- teacher in the teaching competence in science. It was exhibited that the student-teachers teaching competence is enhanced by the neurocognitive strategies and neurocognitive therapy in the classroom [8].

III. RATIONALE FOR SELECTING THE TOPIC

There are substantial numbers of modern methods of learning and innovative strategies are followed by the learners to attain high level of academic achievement in their subjects. But most of the learning strategies failed to attain the learners to achieve better in their academics. Hence role of the facilitators to adapt better and variety way of strategies to be implemented in their classroom transaction. Hence the investigators desired to study the attitude of learners with regard to the neural basis of thinking about thinking called Neurocognitive Learning Strategies. The significant point to be noted in this junction is that the facilitators should learn the pace of the learner's concentration level according to their attention and processing speed of learner's brain.

IV. EMERGING AND JUSTIFICATION OF THE PROBLEM

In the present era of teacher education, the delivering of context to the learner by the facilitator is an important role in the teaching-learning processes. There are many modern methods of teaching are advocated by the teachers such as virtual learning, self-instructed e-module, e-teaching, cognitive tutoring, metacognitive strategy, neurocognitive strategy, audio-visual presentation, Information and Communication Technology (ICT) enable interactive board, creative teaching, real-world learning, brainstorming, role play, stimulating classroom environment, work together as a team etc. Among the various modern method of teaching, the researcher decided to investigate on the major domain of neural basis of cognitive strategies in teaching, learning and

thinking areas. The nerve cells/neurons are the chemical building blocks of the human brain. Our brain is composed of a multitude of simple chemical building blocks.

The two most important functions every neuron plays in the body are (i) to monitor and relay information or messages from one neuron to another using a combination of what are called Nerve impulses and neurotransmitters; and (ii) to 'learn', as it were, by forming sophisticated networks of neuronal patterns with other cells of its type as though they were simple mini-brains [9].

Hence the investigator felt the need to understand an effective delivery of transacting the neural basis of thinking about thinking of human brain to the science students in secondary level. Therefore by applying the principles of brain based instructions and application of neurocognitive learning strategies were provoked for selecting problems in the present investigation.

V. OPERATIONAL TERMS

The Cambridge English dictionary [10] defines the following terms as,

Attitude: A feeling or opinion about something or someone, or a way of behaving that is caused by this

Thinking: The activity of using your mind to consider something

Neural: Related to nerve cells and its communication

Neurocognitive Strategy: It is the strategy developed by the researcher using techniques, theories and models from neurocognitive domain skills, neural basis of thinking about thinking, brain functional areas, Roger Anderson's Neurocognitive learning theory [11].

Scale: A set of numbers, amounts, etc., used to measure or compare the level of something

VI. NEED AND SIGNIFICANCE OF THE PRESENT INVESTIGATION

This study focuses on various lobes/parts of the human brain and its significance role played by nerve cell or neuron. In the past decades, thinking about thinking (Metacognition) was predominantly studied by the cognitive psychologists and educationalists. Recently, he impact of information processing of learning through coding and encoding process, the neural basis of thinking about thinking, right and left hemisphericity, dominant roles of brain, transmission of nerve impulses, genetic basis of learning, gene coding for the influence of learning, neurobiological aspects of learning, brain based instructional strategies are emerging in the educational studies. With this broad range of major perspective, the researchers were undertaken to develop, construct, validate and standardize an attitude scale to measure the Neurocognitive learning strategy attitude of science students in secondary level towards brain based approach in learning.

VII. ASSUMPTIONS

a) The science students in secondary level are unaware of neurocognitive learning strategy and it reflects on their lack of concentration in science.
b) If the science students in secondary level are given orientation of neurocognitive learning strategies, the academic strengthen in science will be improved.

VIII. OBJECTIVES

i. To construct and standardize Neurocognitive attitude scale (NAS) for science students in secondary level.
ii. To find out attitude score of science students in secondary level.
iii. To analyze the attitude scale using Cronbach alpha method.
iv. To establish validity and reliability of Neurocognitive Attitude Scale (NAS) among the science students in secondary level.

IX. CONTENT ANALYSIS

In order to construct the tool, the researchers referred national and international journals, proceedings, basic anatomy of human brain and experts in the field of education and cognitive psychology. Initially the rough form of scale consisted of 22 neurostatements. After the scrutiny of experts, the numbers of neurostatements were reduced into 16 as an initial draft. Thus the initial draft of Neurocognitive attitude scale consisted of 16 neurostatements.

9.1 Scoring Procedure:

Each neurostatement of the scale is followed by three alternatives viz., to a large extent, to some extent and not at all. Among the 16 neurostatements, 13 statements were positive and remaining 3 neurostatements were negative which have to be checked on three point attitude scale. The scoring for each positive neurostatements are scored 3, 2 or 1 for to a large extend, to some extend and not at all respectively. Scores are reversed for each negative neurostatements. Therefore, a respondent can get a maximum score of 48 and a minimum score of 16.

9.2 Preliminary Tryout:

For the purpose of its tryout, the Neurocognitive Attitude Scale was administered on a sample of 106 secondary school students randomly selected from five different schools in Chennai and Thiruvallur districts of Tamilnadu, India. The instructions were informed to the responded to response to the scale by entering appropriated tick mark (✓) in their response sheet.

9.3 Item Analysis

In this present pilot study the test items were analyzed using Cronbach's Alpha values [12]. The values above 0.7 are often considered to be acceptable, if the value is below that said level then the item should be re-modified and a pilot study has to be conducted or else the item can be omitted.

9.4 Final Tryout:

The final version of the scale which consisted of 15 neurostatements was again administered on a sample 30 science students in secondary level for further statistical performance like establishing the validity (face, Content and construct) and reliability of the scale and preparation norms for the final scale.

9.5 Statistical Techniques Used

Mean (M), Standard Deviation (SD), Cronbach's Alpha values, inter-item correlation and variance matrices, percentage analysis, and reliability values by Cronbach's Alpha coefficient was employed for analysis of the data.

X. DELIMITATION

i. The investigation was confined to 5 schools only.
ii. The boards of studies such as International Baccalaureate (IB), International CBSE (ICBSE) and Indian Certificate of Secondary Education, (ICSE) were not included.

XI. CONCLUSION

The attitude scale to measure neurocognitive learning strategy constructed, developed and standardized by the investigators for the first time in the field of educational cognitive science. It can be used to study the impact of modern method of activating neural basis of learning among the learners. Lastly, based on the above information, it can be concluded that the neural basis of thinking about thinking will definitely help the learners to understand the concept vividly and stores the gathered information strongly in the human brain.

XII.EDUCATIONAL IMPLICATIONS

a) Neurocognitive attitude scale has important implications for advanced method of learning among the learners to achieve more than their learning potential.
b) It helps the learners to think creatively.
c) It improves the scholastic area of learners.

ACKNOWLEDGMENT

The authors express their gratefulness to all those who participated in this investigation and equip the research process. The authors are thankful to ***Mrs. R. Sangeetha*** for helping in the data sheet correction and uploading of marks in MS-Excel spreadsheet.

REFERENCES

[1]. Schmidt, S. J., Mueller D. R., & V. Roder, Social cognition as a mediator variable between neurocognition and functional outcome in schizophrenia: empirical review and new results by structural equation modeling, *Schizophr Bulletin, 37(2),* 2011, 41-54.
[2]. R. Sridhar and P. Pandia Vadivu, 2014, Emerging trends in Educational NEUROSCIENCE approaches to teaching and learning-A narrative review, *Excellence in Education-An international journal of Education and Humanities*, 3(1), 2014, 6-10.
[3]. A. Ananda Kumar and K. Chellamani, Educational Research on Neurocognitive perspective: A trend analysis, *Research Nebula, 4(4),* 2016, 40-43, retrieved from http://www.ycjournal.net/ResearchNebula/ResearchPapers.aspx.
[4]. N. Sasikumar, M. Parimala Fathima and S. Mohan, Effect of Neurocognitive Intervention strategies on enhancing competency among graduate teacher trainees, *American Journal of Educational research, 4(11),* 2016, 785-791, doi:10.12691/education 4-11-2.
[5]. R. Sridhar, P. Pandia Vadivu and C. Jeyabalan, Modern Method of Teaching and Learning through Neurocognition: An Innovative Brain Based Strategy for Teachers and Learners, *European Academic Research Journal, 3(2),* 2015, 2141-2151, retrieved from http://www.euacademic.org/UploadArticle/1661.pdf.
[6]. K. Mridula, *Effectiveness of neurolinguistic intervention strategy on fostering reflective thinking and writing competence in English among secondary school students, Doctoral diss.,* Pondicherry University, Puducherry, India, 2015.
[7]. P. Pandia Vadivu and R. Sridhar, An innovative method of teaching-learning strategies to enhance the learners' educational process: Paradigm shift from conventional approach to modern approach by Neurocognitive based concept mapping, *Advance in*

Art, Social Science and Education Research, 4(12), 20147, 661-669, retrieved from http://nigeria-education.org/journals/advances-arts-social-sciences-and-education-research.
[8]. A. Ananthi, *Role of neurocognitive therapy in facilitating teaching competence in science education among D.T.E students, Doctoral diss.,* Alagappa University, Tamilnadu, India, 2009
[9]. P. Pandia Vadivu, *Metacognition and learning strategies* (Excellent publisher, Kanchepurum, Tamilnadu, India, 2014)
[10]. Operational Terms, Cambridge English dictionary, 2018, retrieved from https://dictionary.cambridge.org/.
[11]. O. Roger Anderson, Neurocognitive theory and constructivism in science education: A review of neurobiological, Cognitive and cultural perspectives, *Brunei International Journal of Science and Mathematics Education, 1(1),* 2009, 1-32.
[12]. L.J. Cronbach, Coefficient alpha and the internal structure of tests. *Psychometrika, 16,* 1951, 294-334.

Table-1. The percentage frequency distribution for the present study

S.No.	Variable	Category	Frequency	%	Total
1.	Gender	Male	52	49.1	
		Female	54	50.9	106
2.	Studying class	Class 9	51	48.1	
		Class 10	55	51.9	106
3.	Board of affiliation	CBSE	51	48.1	
		MATRIC	55	51.9	106

Table-2. The school, gender and class wise distribution for the present study

Board/School		N	Male	Female	class 9	class 10
Matric	GCMHSS	22	9	13	10	12
CBSE	VVCBSE	19	10	9	9	10
CBSE	ABSVM	32	16	16	15	17
Matric	ABSMHSS	21	11	10	11	10
Matric	VOCMHSS	12	6	6	6	6
Total		**106**	**52**	**54**	**51**	**55**

Table-3. The scale statistics for the present study

Category	No. of respondents	Mean (M)	Standard Deviation (SD)
Total Sample	106	43.47	3.921

Table-4. Item analysis using Cronbach's Alpha method

Item No.	Mean	Scale Variance	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	Round off values	Status of analysed item
Item_1	40.80	12.960	.447	.474	.704	0.7	Selected
Item_2	40.80	12.808	.483	.470	.699	0.7	Selected
Item_3	40.82	12.491	.555	.504	.690	0.7	Selected
Item_4	40.74	12.349	.624	.560	.683	0.7	Selected
Item_5	40.89	11.301	.662	.568	.610	0.6	Not selected
Item_6	40.92	13.259	.325	.386	.719	0.7	Selected
Item_7	40.75	15.425	-.076	.213	.752	0.8	Selected
Item_8	40.90	12.913	.368	.295	.714	0.7	Selected
Item_9	40.67	14.319	.274	.252	.722	0.7	Selected
Item_10	40.64	14.575	.228	.152	.726	0.7	Selected
Item_11	40.77	14.120	.283	.271	.721	0.7	Selected
Item_12	40.73	15.248	-.023	.173	.746	0.7	Selected
Item_13	40.67	14.890	.105	.138	.734	0.7	Selected
Item_14	40.66	14.207	.342	.291	.718	0.7	Selected
Item_15	40.64	14.404	.266	.126	.723	0.7	Selected
Item_16	40.68	14.829	.109	.171	.735	0.7	Selected

Sridhar R., Pandia Vadivu P & Sundararasan T "*Attitude towards Neural Basis of Thinking about Thinking: Development and Standardization of Neurocognitive Attitude Scale*."International Journal of Humanities and Social Science Invention (IJHSSI) 7.06 (2018): 81-85.