

Enhancing Teaching Competency of Graduate Teacher Trainees through Metacognitive Intervention Strategies

M. Parimala Fathima¹, N. Sasikumar^{2,*}, M. Panimalar Roja³

¹Alagappa University College of Education, Karaikudi, Tamil Nadu, South India

²Bharath College of Education, Thanjavur, Tamil Nadu, South India

³Center for Research in Education, Thava Thiru Kundrakudi Adigalar College Campus, Kundrakudi, Tamil Nadu, South India

*Corresponding author: sasismile25@gmail.com

Received March 06, 2014; Revised March 29, 2014; Accepted March 31, 2014

Abstract Teacher competencies facilitate physical, intellectual, social, and emotional development of the students. The teaching competency of a teacher is determined by various aspects. In this study, the investigator developed teaching competency on five dimensions namely induction, content, pedagogy, organization and Assessment. The findings revealed that there is a continuous improvement in all the dimensions of teaching competency. It further shows that every teacher needs to review/update his/her potential in all possible novel/new/innovative strategies, so as to modify and improve his/her teaching competency in accordance with the changes envisaged in the educational system. The investigator suggests that this experiment will definitely help the future teachers to take their roles confidently by enhancing the teaching competencies in the class room situation. Hence, there is an urgent need to steer our efforts towards the implementation of metacognitive intervention strategies to enhance teaching competencies at all levels of teacher education.

Keywords: metacognition, pedagogy, teaching competency, intervention strategies

Cite This Article: M. Parimala Fathima, N. Sasikumar, and M. Panimalar Roja, "Enhancing Teaching Competency of Graduate Teacher Trainees through Metacognitive Intervention Strategies." *American Journal of Applied Psychology*, vol. 2, no. 1 (2014): 27-32. doi: 10.12691/ajap-2-1-5.

1. Introduction

Teacher competencies facilitate physical, intellectual, social, and emotional development of the students. The teaching competency of a teacher is determined by various aspects. In this study, the investigator developed teaching competency on five dimensions namely induction, pedagogy, organization and Assessment. The findings revealed that there is a continuous improvement in all the dimensions of teaching competency. It further shows that every teacher needs to review/update his/her potential in all possible novel/new/innovative strategies, so as to modify and improve his/her teaching competency in accordance with the changes envisaged in the educational system. The recent trends in school education such as common school system; non graded schooling, Activity oriented, experiential learning etc. call for changes in teacher education in the secondary level also. The innovative practice of Metacognitive intervention strategies is a pointer in this direction. The investigator has implemented Metacognitive strategies during the experimentation period. After the implementation of Metacognitive intervention strategies, the researcher found that there was a notable positive change in the teacher and teaching competency of graduate teacher trainees. By implementing this strategy the graduate training students, were able to internalize their ideas to bring out the concept

perfectly due to self-regulation, a component of Metacognitive intervention. Planning, monitoring and evaluating are the other three dimensions under Metacognitive intervention that were used by the investigator to enhance the teaching competency of graduate teacher training students

1.1. Conceptual Understanding of Metacognition and Teaching Competency

The traditional methods of teaching have failed to generate the required behavioural outcomes, abilities and skills needed to facilitate the learning of curricular subjects. Knowledge of the recent development will help the teacher in making his/her teaching more effective and increase his/her efficiency as classroom functionary. Such a background will solve classroom problems. This will also enable him/his to organize teaching activities and select instructional design and teaching models and innovate appropriate strategies and techniques. It should give enough scope for developing learning environment among students. Effective teaching depends on the evolution of innovative strategies and also the methodology of teaching (Nagendra Singh. H. 1988). Teaching is a process by which the teacher and students create an interactive environment, in such a way that the students become effective and productive learners (Flutcher Shirley 1992). Designing meta cognitive programme that focus on both cognitive and social

development is a theoretical and practical challenge. Instructional approaches emphasizing awareness of the cognitive process that facilitates one's own learning and its application, to academic and work assignment (Diggory, S.F. 1972). Typical Metacognitive techniques include systematic rehearsal of steps or consciously selecting among strategies for completing a task (Anderson, J. 1985). Metacognition is often simply defined as "thinking about thinking". In actuality, defining metacognition is not that simple. Although the term has been part of the vocabulary of educational psychologists for the last couple of decades, and the concept for as long as humans have been able to reflect on their cognitive experiences, there is much debate over exactly what metacognition is. One reason for this confusion is the fact that there are several terms currently used to describe the same basic phenomenon (e.g. self regulation, executive control) or an aspect of that phenomenon (e.g. meta-memory) and these terms are often used interchangeably in the literature. While there are some distinctions between definitions all emphasize the role of executive processes in the overseeing and regulation of cognitive processes.

The term "Metacognition" is most often associated with John Flavell, (1979) According to Flavell (1979, 1987) Metacognition consists of both metacognition knowledge of metacognitive experience or regulation. Meta cognitive knowledge refers to acquired knowledge about cognitive processes, knowledge that can be used to control cognitive process. Flavell further divides metacognitive knowledge into three categories. Knowledge of person variables, task variable and strategy variables. Metacognition is the knowledge and awareness of one's own cognitive processes (Flavell 1976) and the ability to monitor, regulate and evaluate one's thinking (Brown 1978). Metacognitive skills include checking, planning, selecting, monitoring, self questioning and interpreting ongoing experience (Brown, Campione, Flavell Well man). Metacognition is the conscious control over the solution process (Chore & Carey 1984). Metacognition is an indicator of the educated intellect (Costa 1991) Metacognition is the state where one is conscious of one's thinking and problem solving (Cohen 1994).

Schunk & Zimmerman (1994) Winne (1995) Zimmerman (1994) Self-regulation refers to students' ability to understand and control their learning. Knowledge and strategies in isolation are not sufficient for self regulation. Students must understand the strengths and limitations of their knowledge and strategies in order to be able to use them efficiently. Educational psychologists refer to this capability as metacognition, or explicit knowledge of one's own cognition, metacognition includes two main components referred to as knowledge of cognition and regulations of cognition (Baker, 1989, Schraw & Moshman 1995) knowledge of cognition consists of explicit knowledge of our memory, knowledge base and strategy repertoire, as well as what is often known as conditional knowledge, or knowledge about why, where & where to use strategies. Regulation of cognition consists of knowledge about planning, monitoring and evaluation.

Metacognitive research includes studies in which people monitor available information during the course of their own thinking and then use this information to

regulate subsequent memory process (Kluwe, 1982; Schneider 1985; Schoenfield 1987; Paris and Winograd 1990) refer to this category of research as studies of self management, which is metacognition in action. This helps to orchestrate aspects of problem solving which includes the plans that learner make before tackling of task, the adjustments they make as they work, the revisions they make afterwards, and how learner regulate his selection of strategies based on information he monitors while employing the strategies. People are assumed to have monitored and regulated their use of strategies if they select more efficacious one (Levin and Ghatala 1984)

The relationship between metacognition and executive control is explored. According to an analysis by Fernandez-Deque, Baird and Posher, the aspects of Metacognition are presumed to be by neural circuit involving mid frontal brain regions. They emphasize the biological basis of Metacognition and suggest that mid frontal brain regions are part of a neural circuit that enables metacognitive regulation. Investigations of executive control have assessed and defined specific components such as selecting stimulus information, maintaining information in working memory and manipulating information processing. Thus, the linking of metacognition to aspect of executive control offers opportunities to define better cognitive components of metacognition.

The distinctions between cognitive and metacognitive strategies are important, partly because they give some indication of which strategies are the most crucial in determining the effectiveness of learning. It seems that metacognitive strategies, which allow students to plan, control and evaluate their learning have the most control role to play in this respect, rather than those that merely maximize interaction and input thus the ability to choose and evaluate one's strategies is of control importance. (Grahane 1997).

They Focus students' attention solely on learning the language, second language teachers can help students to learn to think about what happens the language learning process, which will lead to develop stronger learning skills. Hence it is inferred that Metacognition combines various thinking and reflective processes. It can be divided into five primary components:

1. Preparing and planning for learning
2. Selecting and using learning strategies
3. Monitoring strategy use
4. Orchestrating various strategies
5. Evaluating strategy use and learning

Teacher should model strategies for learners to follow in all the above said five areas.

Studies shows that increase in learning have followed direct instruction in metacognitive strategies. These results suggest that direct teaching of these thinking strategies may be useful, and that independent use develops gradually (Scruggs 1985) learning how to learn, developing a repertoires of thinking processes is a major goal of education.

During the formation and construction of scale to assess meta cognitive intervention strategies the investigator referred and followed some relevant information about meta cognition, metacognitive abilities, meta cognitive processes, metacognitive learning, meta cognitive components of teaching behaviour, metacognitive theory

development, metacognitive memory strategies, retrieval strategies, Biophysiological metacognition and sociological metacognition, brain compatible on metacognition. Based on this information the investigator developed a “Metacognitive Intervention Strategies Scale” with the help of educational experts. The scale consists of 26 (twenty six) components under 3 dimensions.

Competency is an improved modern term applied to the way of doing things in the competency way; the right way to perform a job, the right way to live and work in association and co-operation with others. According to Copper (1973) Teacher competencies are the resultant of attitudes, understanding, skill and behaviours, that facilitate intellectual, social, emotional and physical growth in children. During the formation and construction of scale to assess competency in teaching physical science the investigator revised some relevant information about competencies like teaching competency, teacher competency, characteristics of competent teacher, pre-service training and teacher competency, concept of competent teacher. Some classification of competencies, strategies for evaluation of teaching competencies by functional level, competencies by area of application, source factors affecting teaching competency, based on these information the investigator developed a ‘Teaching Competency Scale’ with help of educational experts, consists of 5 dimensions with 43 items.

2. Need for the Study

Development of competence and professional skills are the major objectives of most of the teachers educator programmes. The methodology adopted by the teacher in the classroom needs frequent change as the students attitude and aptitude change year after year. The challenges posed by technological developments and the results of neuro psychological studies demand a comprehensive teaching methodology to get the designed output in the classroom. Innumerable methods have been developed, suggested and experimented by both teachers and teacher educators. The teachers deal with individual human beings where each one is distinct in thinking and learning in the classroom. Naturally, the teacher has to select a suitable methodology and perceive its effect in the classroom. The teacher of tomorrow would design the teaching situation to develop the pupil’s skills and competencies. Successful and effective teaching requires two basic things. The teacher should be competent to teach the subject allotted to him. At the same time he/she shall follow appropriate methodology and technology of teaching. Teaching is a process by which the teacher and students create an interactive environment, in such a way that the students become effective and productive learners. Designing metacognitive activates that focus on both cognitive and social development is a theoretical and practical challenge. Effective metacognitive strategies equip them in adopting teaching methods. In the classroom there are ample opportunities to adopt metacognitive strategies to enhance the teaching competency.

3. Objectives of the Study

1. To assess the level of teaching competency in physical science among the student teachers.
2. To assess the level of metacognition among the student teachers
3. To identify the metacognitive strategies that would enhance the competency in teaching physical science among student teachers
4. To develop and implement the model to the student teachers to enhance the teaching competency in graduate teacher training students.
5. To find out the effect of mtacognitive intervention strategies on teaching competency in physical science among students teachers.

4. Research Methodology

Experimental method will be adopted by the investigator in this research. Single group design will be adopted (or) Pre-test, Progressive test and post design.

5. Sample

5.1. The Present Investigation was Conducted in Alagappa University College of Education, Karaikudi, Tamilnadu, South India

5.2. Selection of the Sample

All the all the 30 trainees (13 Boys &17 Girls) of Physical Science (optional) formed the sample of the study. Single group pre test treatment post test design and purposive sampling techniques were followed

6. Hypotheses

There will be significant mean difference between the pre and post assessment scores on teaching competency in Physical Science trainees.

There will be significant mean difference between the pre assessment and post assessment level of the metacognition among the student teachers.

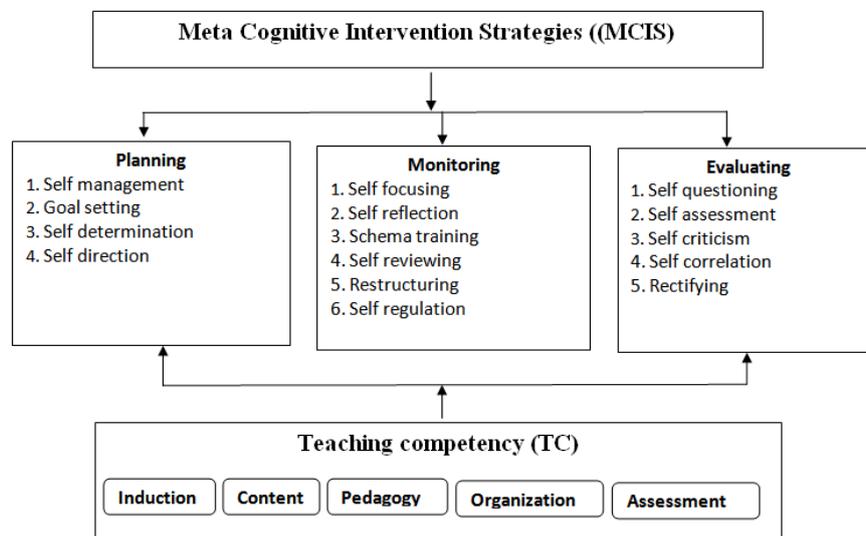
7. Metacognitive Orientations

Metacognitive environment encourages awareness of thinking. Planning is shared among teachers, school library media specialists, and students. Thinking strategies are discussed. Evaluation is ongoing. In the creation of metacognitive environment, teachers monitor and apply their knowledge deliberately modeling metacognitive behavior to assist students in becoming aware of their own thinking. Metacognitive strategies are already in teachers’ repertoires. The teachers must become alert to these strategies, and consciously model them for students. Problem-solving and research activities in all subjects provide opportunities for developing metacognitive strategies. Teachers need to focus student attention on how tasks are accomplished. Process goals, in addition to content goals, must be established and evaluated with

students so that they discover that understanding and transferring thinking processes improve learning.

Understanding, cognitive processes and metacognitive process may be one of the most essential skills that classroom teacher can help second language learners develop. It is important that they teach their students metacognitive skills in addition to cognitive skills. The distinctions between cognitive and metacognitive strategies are important, partly because they give some indication about the strategies are the most crucial in determining the effectiveness of learning. It seems that metacognitive strategies, that allow students to plan, control and evaluate their learning have the most control role to play in this respect, rather than those that merely maximize interaction and input thus the ability to choose and evaluate one's strategies is of central importance. (Grahane 1997). They Focus students' attention solely on learning the language, second language teachers can help students to learn to think about what happens to the language learning process, which will lead to develop stronger learning skills. Hence it is inferred that Metacognition combines various thinking and reflective processes. It can be divided into five primary components: (1) Preparing and planning for learning (2) Selecting and using learning strategies (3) Monitoring strategy use (4) Orchestrating various strategies (5) Evaluating strategy use and learning. Teacher should model strategies for learners to follow in all the above said five areas. Metacognition is thinking about thinking, knowing "what we know" and what we don't know. Just as an executives' job is management of an organization, a thinker's job is management of thinking. According to Dirkes (1985).

(1)Connecting new information to former knowledge, (2) Selecting thinking strategies deliberately, (3) Planning, monitoring and evaluating thinking processes. A thinking person is in change of his/her behaviour. He/ She determines when it is necessary to use metacognitive strategies. He/ She select strategies to define a problem situation and researches alternative solutions. The teacher tailors this search for information to constraints of time and energy and also monitors, control and judges thinking. The teacher evaluates and decides when a problem is solved to a satisfactory degree or when the demands of daily living take a temporary or permanent higher priority. Studies show that increase in learning have followed direct instruction in Metacognitive strategies. These results suggest that direct teaching of these thinking strategies may be useful, and that independent use develops gradually (Scruggs 1985) learning how to learn, developing a repertoires of thinking processes is a major goal of education. During the formation and construction of scale to assess meta cognitive intervention strategies the investigator, referred and followed some relevant information about meta cognition, metacognitive abilities, meta cognitive processes, metacognitive learning, meta cognitive components of teaching behaviour, metacognitive theory development, metacognitive memory strategies, retrieval strategies, Biophysiological metacognition and sociological metacognition, brain compatible on metacognition. Based on this information the investigator developed a "Metacognitive Intervention Strategies Scale" with the help of educational experts. The scale consists of 26 (twenty six) components under 3 dimensions.



After conducting orientation programme about meta cognitive intervention strategies and teaching competency in physical science to assess the present level of Meta Cognitive Intervention Strategies and Teaching Competency on science tools were used. These tools are constructed and validated by the investigator with the help of education experts. Investigator assessed the teaching competency in Physical Science and Meta Cognitive Intervention Strategies of B.Ed. trainees and the scores were averaged to get the initial level of performance. The same tools were for the post-assessment on Metacognitive Intervention Strategies and Teaching Competency in Physical Science. After conducting the Pre-assessment test,

the investigator conducted theoretical orientation programme on Metacognitive Intervention Strategies to B.Ed. trainees. Before starting the orientation programme the trainees had no idea of the Metacognitive Intervention Strategies. During this treatment period the investigator explained in detail about the role of Meta cognition in teaching – learning process, Meta cognitive components, Meta cognitive orientation, Meta cognitive intervention strategies and brain compatibility on Meta cognition. The Intervention Strategies would help them to enhance teaching competency in Physical Science. After conducting a Pre-assessment test the investigator conducted theoretical orientation programme on teaching

competency to B.Ed. trainees. During this period details on teaching competency, characteristics of competent teacher, pre-service training and teacher competency, concept of competent based teacher, various dimensions of teaching competency like Induction, Content, Pedagogy, Organization and assessment were discussed. Model for teaching competency in Physical Science was developed by the investigator. This model was demonstrated by investigator through classroom teaching. The teacher trainees were allowed to practice the teaching competency in physical science through Meta cognitive Intervention Strategies during the teaching practice period. During teaching practice, teaching competency in Physical Science was assessed by Self and Peer group using the competency scale. At the same time Meta Cognitive Intervention Strategy was assessed by investigator based on self – opinion. Post-assessment test was conducted after giving the treatment. During the post-assessment the same Metacognitive Intervention Strategies scale and

teaching competence of physical science scale were used. Data collected in Pre-assessment, Progressive-assessment and Post-assessment was analyzed using appropriate statistical techniques.

8. Major Findings

8.1. Correlation Between Metacognitive Intervention Strategies (Pre and Post) and Dimensions of Teaching Competency (Pre and Post)

The teaching competency of graduate teacher training students in physical science is enhanced due to MCIS, as revealed by the improvement in post assessment mean scores. There is significant correlation between post assessment of MCIS and teaching competency in physical science

	MET PRE	MET Post	TC Pre-1	TC Post-1	TC Pre-2	TC Pos-2	TC Pre-3	TC Post-3	TC Pre-4	TC Post-4	TC Pre-5	TC Post-5
MET PRE	1.00											
MET Post	0.606**	1.00										
TC Pre-1	0.073	0.057	1.00									
TC Post-1	0.089	0.030	0.042	1.00								
TC Pre-2	0.022	0.141	0.028	0.478**	1.00							
TC Post-2	0.129	0.031	0.189	0.814**	0.444**	1.00						
TC Pre-3	0.101	0.047	6.337	0.529**	0.491**	0.499	1.00					
TC Post-3	0.664	0.123	0.030	0.345	0.431*	0.376*	0.331	1.00				
TC Pre-4	0.384*	0.218	0.040	0.039	0.249	0.112	0.208	0.018	1.00			
TC Post-4	0.021	0.104	0.052	0.707**	0.283	0.701**	0.387*	0.337	0.029	1.00		
TC Pre-5	0.146	0.088	0.186	0.275	0.361*	0.305	0.694**	0.076	0.398*	0.140	1.00	
TC Post-5	0.009	0.122	0.117	0.650**	0.383*	0.662**	0.547**	0.211	0.096	0.531**	0.407	1.00

8.2. Mean and SD Scores of Pre and Post Assessment on Teaching Competency

S.No	No	Teaching Competency	Mean	SD
1.	30	Pre Assessment	69.06	11.88
2.	30	Post Assessment	97.80	14.79

The mean score of teaching competency in post assessment(97.80) is greater than the mean score of teaching competency in pre assessment (69.06). it could be inferred that the intervention strategies(MCIS) have started working to improve the teaching competency.

8.3. Mean and SD Scores of Pre and Post Assessment on metacognitive Intervention Strategies

The mean score of MCIS in post assessment (71.90) is greater than the mean score of MCIS in pre assessment (58.13). It is evident that there is an enhancement of transformation of knowledge.

S.No	No	Metacognitive Intervention Strategies	Mean	SD
1.	30	Pre Assessment	58.13	6.67
2.	30	Post Assessment	71.90	5.95

8.4. ‘r’ and ‘t’ Values Between Progressive Assessment (Self and Peer Group) and Post Assessment Scores on Teaching Competency

It is evident that the introduction of MCIS has improved that the level of teaching competency. The calculated ‘t’ value 11.71 is greater than the theoretical value of 2.58 at 0.01 level. The difference between the

means of pre and post assessment scores in MCIS is significant at 0.01 level.

S.No	Teaching Competency	“r”	“t”
1.	Progressive assessment (Self & Peer group)	0.098*	11.71**
2.	Post - assessment		

* Not significant at 0.01 level, ** Significant at 0.01 level.

8.5. There is A Significant Real Improvement in Enriching the Concepts of Metacognitive Intervention Strategies from Pre to Post Assessment. There is A Gain of 70% in Teaching Competency (Due To MCIS) by the Activation of Brain Compatibility Process

8.6. Distribution of ‘r’, ‘t’, ‘d’ and ω² Values between Pre and Post Assessment Scores on Metacognitive Strategies

The value of 2 (0.74) indicates the difference in pre and post assessment means, due to 74% variation of the dependent variable (i.e.) enhancing teaching competency of graduate teacher training students.

S.No.	Teaching Competency	‘r’	‘t’	‘d’	ω ²
1.	Pre and Post assessment	0.606	13.363	2.18	0.74

9. Delimitation

In the present study, only graduate teacher training students who opted physical science as their optional subjects. The experiment was spread over for a period of

two months. Metacognitive intervention strategies were adopted to develop teaching competency in the form of programmes in the classroom. This study is confined only to Alagappa University College of Education, Karaikudi, Tamilnadu, South India.

10. Educational Implication

The investigator suggests that the following recommendation of NCTE, NCERT and educational bodies to improve the teaching competency of graduate teacher training students. Theoretical aspects of (MCIS) metacognitive intervention strategies can be introduced as a unit of the core subject in the graduate teacher training curriculum. The practical inputs regarding metacognitive intervention strategies should be taken up through subject specific programmes such as lesson plan writing, observation classes and practice teaching. The same can be tried at various levels and also in in-service teacher programmes and distance teacher education programme.

11. Conclusion

In this study, the investigator developed teaching competency on five dimensions namely induction, content, pedagogy, organization and assessment. The findings revealed that there is a continuous improvement in all the dimensions of teaching competency. By implementing this strategy the graduate teacher training students, were able to internalize their ideas to bring out the concept perfectly due to self-regulation, a component of metacognitive intervention. Planning, monitoring and evaluating are the other three dimensions under metacognitive intervention that were used by the investigator to enhance the teaching competency of graduate teacher training students. The investigator suggests that this experiment will definitely help the future teachers to take their roles confidently by enhancing their teaching competency in the classroom situation. There is an urgent need to steer our efforts towards the implementation of Metacognitive intervention strategies to enhance teaching competency at all levels of Teacher Education.

Reference

- [1] Anderson, J. (1985). 'Cognitive Psychology' New York; W.H. Freeman & Co.
- [2] Anderson, M. (1992). 'Intelligence and Development: A Cognitive Theory' Oxford Blackwell.
- [3] Ashcraft, M. (1989). 'Human Memory and Cognition' Glenieve, Scott Foresman.
- [4] Bransford, J. (1979). 'Human Cognition: Learning Understanding and Remembering', Belmont, CA: Wadsworth.
- [5] Buch, M.B. (Ed.) (1987). 'Third Survey of Research in Education', New Delhi, NCERT.
- [6] Buch, M.B. (Ed.) (1991). 'Fourth Survey of Research in Education', New Delhi, NCERT.
- [7] Carroll, J.B. (1993). 'Human Cognitive Abilities', A Survey of Factor Analytic Studies, New York: Cambridge University Press.
- [8] Cohen, L. (1976). 'Educational Research in Classroom and Schools'. A manual of; Materials and Methods, London: Harper and Row.
- [9] Committee on undergraduate science education (1997). 'Science Teaching Reconsidered (A Hand book)', Washington, D.C., National Academy Press.
- [10] Diggory, S.F. (1972). 'Cognitive Process in Education A Psychological Preparation for Teaching and Curriculum Development', New York: Harper and Row.
- [11] Flavell, J.H. (1977). 'Cognitive Development', Englewood cliffs, NJ: Prentice Hall.
- [12] Flutcher Shirley (1992). 'Competence-Based Assessment Techniques', London: The Kogen Page Practical Trainer Series.
- [13] Gage, NL (Ed.) (1964). 'Handbook of Research on Teaching', Chicago: Rand Mc Nally & Company
- [14] Garrett, H.E. (1979). 'Statistics in Psychology and Education', Bombay; Vakils, Feffer and Simons Ltd.,
- [15] John Gardiner. M (1976). 'Reading in Human Memory' Methuen & Co. Ltd., London.
- [16] John castellan N. Sidney Siegel, Jr. (1988). 'Non Parametric Statistics' Second Edition, New York: Mc Graw – Hill Book Company.
- [17] Joyce, Bruee & Harootunian Berg (1967). 'The Structure of Teaching', Chicago: Science Research Associate, Inc.
- [18] Mangal S.K. (1997). 'Abnormal Psychology', (revised Ed.) New Delhi, Sterling publishers Ltd.
- [19] Michael Eraut, (1994). 'Developing Professional Knowledge and Competence', The Falmer press – London – Washington D.C.
- [20] Mohan S. (2003). 'Cognitive Perspective' (course material for M.Phil Distance Education), Department of Education, Alagappa University, Karaikudi,;
- [21] Nagendra Singh, H. (1988). 'Modernization of Teacher Education' (An Indian Experiences), New Delhi; Common Wealth Publishers.
- [22] NCERT (1973). 'Innovated Practices in Teacher Education in India at Secondary Level' (Vol. 3) New Delhi: Department of Teacher Education, National Institute of Education.
- [23] Sharma, S.R. (1997) 'Teacher Training and Educational Research', Anmol Publication Pvt. Ltd. New Delhi.
- [24] Sousa, David A. (2001). 'How the Special Needs Brain Learners'. California: Sage Publications.
- [25] Symons, S. & Woloshyn, (1995). 'Cognitive Strategy Instruction', (2nd Ed.) Cambridge, M.A.: Brookline Books.
- [26] Tara Chand & Ravi Prakash (1997). 'Advanced Educational Psychology' New Delhi: Kanishka Publishers.
- [27] Vancouver, B.C. (2000). 'Biopsychology'. Third Edition, University of British Columbia. Canada: Department of Psychology.
- [28] Venkataiah, S. (2000). 'Teacher Education', - Anmol Publishers Pvt. Ltd. New Delhi.
- [29] Walker, E. Dona (1998). 'Strategies for Teaching Differently', California Corwin Press, Inc., A Sage Publications Company.