Original Article

Effectiveness of KWL Metacognitive Strategy on Achievement in Social Science and Metacognitive Ability in Relation to Cognitive Styles

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ABSTRACT

Highlighting the importance of knowledge of learners' Cognitive Styles in planning educational programme, the paper presents the findings of an experimental research undertaken to study the effect of KWL Metacognitive Strategy on Achievement in Social Science and Metacognitive Ability of Secondary Standard Students. Pre-test Post-test single group design has been followed in the study. The experimental treatment was teaching Social Science through KWL Metacognitive Instructional Material in Social Science developed by the authors. Metacognitive Ability and Achievement in Social Science were measured by administering 'Metacognitive Inventory' and Achievement Test in Social Science respectively. Data were analysed applying 't'test and ANOVA. Findings of the study revealed that KWL Metacognitive Strategy is significantly effective in enhancing the Academic Achievement and Metacognitive ability of Secondary School students. Study also revealed that KWL Metacognitive Strategy is equally effective on Achievement in Social Science and Metacognitive Ability of the students with Systematic, Integrated, Intuitive and Undifferentiated Cognitive Styles. Based on the findings of the study recommendations are made to introduce Metacognitive Strategy in Secondary School as a regular feature of Pedagogy.
Keywords: Metacognition, KWL Metacognitive Strategy, Cognitive Styles, Achievement in Social Science, Metacognitive Ability.

INTRODUCTİON

In India Social Science is a compulsory subject at the Secondary level which seeks to present integrated and sequentially arranged knowledge in the area. The primary purpose of Social Science is to help young people to develop the ability to make informed and reasoned decisions for the public good as citizens of culturally diverse democratic society in an interdependent world. (Mathur, Pawan,2005). The social science contains diverse concerns of society and includes a wide content drawn from disciplines of history, geography, political science, economics and sociology (National Curricular Framework 2005). Study of Social Science provides experiences that would enable the students to attain healthy and harmonious relationship to everyone thereby develop the attitudes and skills of peaceful co-existence. Today we see a paradigm shift in the global trend of teaching and learning Social Science. It has reflected in the Indian educational system too. In line with the global trends and changes NCERT integrated major shifts and strategies into our curriculum.

Social Science carries a normative responsibility to create and widen the popular base for peace – oriented human values, such as freedom, justice and respect for diversity. Social Science teaching should be aimed at investing in children moral and mental energy so as to provide them with the ability to think independently and deal with the social forces that threaten these values. This can be achieved by promoting children to critically reflect on social issues (National Curricular Framework 2005). In the light of these demands and the global trends in teaching learning strategies, the objectives of teaching Social Science can be easily attained by employing effective strategies in the teaching of Social Science. Since Metacognition is high order thinking process responsible for active control over Cognitive process. Hence integrating Metacognitive Strategy in the teaching leaning process, Social Science teachers can equip the Students at Secondary level with skills of critical thinking and problem solving. Cognitive Styles refer to the different modes of functioning that characterize an individual's perceptual and intellectual faculties. Cognitive Styles enable an individual to be an effective learner. It refers to how an individual learns, remembers and uses problem solving skill. By becoming aware of the different cognitive styles students can be helped to enhance their achievement in Social Science while integrating Metacognitive Strategies.

Metacognition

Metacognition has been in the forefront of discussion both in education and psychology alike during the recent years. It has emerged as a major focus of research interest in cognitive psychology (Metcalfe and Shimamurar 1996). There has been growing acceptance of the fact that Metacognition or self awareness including awareness of ourselves as learners help us to learn more effectively (Scottish CCC, 1996). Metacognition is referred to as "thinking about thinking" and can be used to help students "learn how to learn". It is cognition about cognition or knowing about knowing. It includes knowledge about when and where to use particular strategies for learning or for problem solving.

The term Metacognition is associated with J.H. Flavell. It was he who used the term for the first time in 1976. According to Flavell Metacognition refers to one's knowledge concerning one's own cognitive processes or anything related to them. It refers to that unique capacity of people to be self-regulative, not just to think and know but to think about their own thinking and knowing. The term Metacognition involves the following.

❖   Metacognition is thinking about thinking and developing the process of solving problems and answering questions.

❖   Metacognition is the examination of how we think about how we do things, how we go about finding solutions, how well we can understand and analyse the systems, strategies and techniques we use to think to do things.

❖   Metacognition is an awareness of the process of how an answer is found, what strategies and type of thought has gone on and the previous experiences that have been used.

❖   Metacognition is to consciously apply a process a procedure to a problem or activity and to be aware that the result is satisfactory or otherwise.

❖   Metacognition is the awareness of the different processes involved in thinking.

❖   Metacognition is the ability to take out our thinking and examine it and put it back, rearrange if necessary (Shareeja Ali MC.Edutrack May 2010).

Metacognitive Strategies

An instructional strategy is defined as something a teacher arranges that is designed to establish interaction between the teacher, the students, and the subject matter, or any combination of these three dimensions. Cognitive Strategies are used to help an individual achieve a particular goal (e.g., understanding a text) while Metacognitive Strategies are used to ensure that the goal has been reached (e.g., quizzing oneself to evaluate one's understanding of that text).Metacognitive means, beside, or with the cognitive. Therefore, Metacognitive Strategies are actions which go beyond purely cognitive devices and which provide learners to coordinate their own learning process. (Begam, 2007).

Metacognitive and cognitive strategies may overlap in that the same strategy, such as questioning, could be regarded as either a cognitive or a metacognitive strategy depending on what the purpose for using that strategy may be. Cognitive and metacognitive strategies are closely intertwined and dependent upon each other. There are different Metacognitive Learning Strategies such as Self-Questioning, PQ4R, KWL, IDEAL. By incorporating these strategies students can be helped to follow a wise course of action in the process of learning.

KWL Metacognitive Strategy

KWL is a strategy enabling students to know what they know, what they want to learn and what they did learn (Dixon-Krauss, 1996). This metacognitive Strategy starts with students' discussion of what they know and listing of the information. Then, students are encouraged to make predictions about what they want to learn. Having read the content of information, students are guided to recall the information they learned. (Parsons et al, 2001.)

KWL Metacognitive Strategy can be used as an effective means to teach Social Science to the students. The steps of KWL Metacognitive Strategy are:

•   K – What you KNOW
•   W – What you WANT to learn
•   L – What you LEARNED

Metacognitive Ability

Metacognitive Ability is the higher order thinking which is essential for meaningful learning. Metacognitive ability is the knowledge concerning one's own cognitive process and product. Activities such as planning how to approach a given learning task, monitoring comprehension, and evaluating progress toward the completion of a task are metacognitive in nature. Metacognition plays a critical role in successful learning so it is important to study metacognitive activity and development to determine how students can be taught to better apply their cognitive resources through metacognitive control.

According to Flavell (1979, 1987), Metacognition consists of both metacognitive knowledge and metacognitive experiences or regulation. Metacognitive knowledge refers to acquired knowledge about cognitive processes, knowledge that can be used to control cognitive processes. Metacognitive experiences involve the use of metacognitive strategies or metacognitive regulation (Brown, 1987). Metacognitive strategies are sequential processes that one uses to control cognitive activities, and to ensure that a cognitive goal (e.g., understanding a text) is achieved. These processes help to regulate and oversee learning, and consist of planning and monitoring cognitive activities, as well as checking the outcomes of those activities.

Metacognitively aware students plan their work properly, know how to manage the information available, monitor their own progress and evaluate them periodically, correct their mistakes in time and are always aware of their knowledge. This awareness leads to meaningful learning in Social Science discipline.

Cognitive Styles

The concept of Cognitive style is a multi-disciplinary one. Though initially a part of psychology now it is the subject matter of education, computer programming and information science. But all of these fields have common goals in mind namely how users process information and how systems can be better built to accommodate the diversity of the user population. Goldstein and Blackman define Cognitive Style as a hypothetical construct that has been developed to explain the process of mediation between stimuli and responses. The term Cognitive style refers to characteristic ways in which individuals conceptually organise the environment. (Goldstein and Blackman 1978).

Coop and Sigel (1971) equated Cognitive Style with modes of behaviour rather than a mediating process. Therefore it is proper to mention here that Cognitive Style is conceived as one of the aspects of psychological differentiation. Psychological differentiation refers to different mode of perceiving, judging and appraising things to which people are exposed to under different conditions. The notion Cognitive Style has been defined as self-evident modes of functioning which individual shows in his perceptual and intellectual activities (Witkin et al, 1962).

Successful learning depends on learners' ability to plan, monitor, evaluate, transfer and application of the knowledge acquired to practical situation. Social Science is an area where the successful learning depends on learners' ability to apply and transfer the knowledge to practical living situation. Hence in the present study the authors have made an attempt to study the effectiveness of Effectiveness of KWL Metacognitive Strategy on Achievement in Social Science and Metacognitive Ability in relation to Cognitive Styles. Cognitive Styles of the students were identified by administering the 'Cognitive Style Inventory' standardized tool developed by Dr.Praveen Kumar Jha (2001) and grouped them as per the dimensions given in the inventory such as Systematic, Intuitive, Integrated, Unidentified and Split Styles.

Systematic Style : An individual with this style operates with a well defined step- by-step approach when solving a problem, looks for an overall method or pragmatic approach and then makes an overall plan for solving the problem.

Intuitive style : The individual, whose style is intuitive use an unpredictable ordering of analytical steps when solving a problem, relies on experience patterns characterized by unverbalized areas or hunches and explores and abandons alternatives quickly.

Integrated Style : A person with an integrated style is able to change style quickly and easily. Such style changes seem to be unconscious and take place in a matter of seconds.

Undifferentiated style : A person with such a style appears not to distinguish or differentiate between the two extremes that is systematic and intuitive and therefore appears not to display a style.

Split Style : An individual with split style shows fairly equal degrees of systematic and intuitive specialization. However, people with a split style do not possess an integrated behaviour response; instead they exhibit each separate dimension in completely different settings using only one style at a time based on nature of their task.

Need and Significance of the Study

The latest document National Curriculum Framework 2005 brought out by the National Council of Educational Research and Training (NCERT),New Delhi in 2005 speaks about the aims and objectives of teaching Social Science at Secondary level as the following.

- Its content should aim at "raising students" awareness through critically exploring and questioning of familiar social reality.
- It will "enable students to develop a critical understanding of society..."
- It should "provide the social, cultural and analytical skills required to adjust to an increasingly interdependent world, and to deal with political and economic realities."

- To make the Social Science learning easier it should lay emphasis on developing concepts and the ability to analyze socio-political realities rather on the mere retention of information without comprehension.
- It should aim at "generating in students a critical moral and mental energy, making them alert to the forces that threaten these values."

It also states that the teaching of Social Science should adopt those methods which promote creativity, aesthetic development, and critical perspectives and enable students to draw relationships between past and present, to understand changes taking place in society.

Review of research studies reveals the significance of Metacognitive Strategies and Cognitive Styles on students' Academic performance. There is a correlation between Metacognition and teaching competency.(Sekar and Annaraja, 2013). There is a high positive correlation between Metacognitive Awareness and Achievement.(Remadevi and Kumar, 2010). There is a significant relationship between Metacognitive Ability and Academic Achievement. (Devaki and Pushpam, 2011).Training in Metacognitive Strategy can improve the students' achievement. (Onu et at, 2012). Teaching through Metacognitive Learning can improve students' performance. (Dejonckheere et al, 2012).

Cognitive Styles do have an effect on students' learning. (Lo et al, 2012).Cognitive Styles have an influence on the patterns of information exchange. (Smith,Vercellone et al,2012). Cognitive Stulyes have significant influence on self regulated learning of students. (Chandran and Kadhiravan, 2012). The development of Styles and Abilities are strongly correlated across age groups, indicating that the path of cognitive style development closely resembles the development path of abilities. (Blazhenkova et al, 2011).There is a correlation between working memory and Cognitive Styles on Adolescent's Academic Attainment. (Alloway et al, 2012).

There is a relationship between academic self-concept, learning strategies and academic achievement. (McInerney et al, 2012) Academic achievement can be enhanced through different learning strategies. Parenting styles moderates the effect of academic self-concept on academic achievement. (Ishak et al, 2012).Parents help children to actualize their cognitive ability by directly communicating their academic expectations to their children. (Phillipson et al, 2012).

Training in Metacognitive Strategy can improve the students' achievement. (Onu et al, 2012), there is a significant relationship between Metacognitive Ability and Academic Achievement. (Devaki and Pushpam, 2011). Employing KWL Metacognitive Strategy in the class room can enhance the achievement among the students. Metacognitive strategy is effective in enhancing the achievement of the learners (Jaunine Fouché and Mark A. Lamport,2011). Metacognitive strategy improves the performance of the learners (Wendy Y.K. Lam, 2009).

Research studies mentioned above reveal that there is a significant relationship between Metacognitive Ability and Academic Achievement. The studies also reveal that the Metacognitive Strategy is effective in enhancing Students Academic Achievement and Higher order thinking. Hence, to attain the objectives of teaching Social Science at Secondary School level listed above, Metacognitive Strategies could be used. With these research evidences and the theoretical background discussed earlier the present study was undertaken.

The Present Study

Title of the Study: Effectiveness of KWL Metacognitive Strategy on Achievement in Social Science and Metacognitive Ability in Relation to Cognitive Styles.

Objectives

1. To study the effectiveness of KWL Metacognitive Strategy on Achievement in Social Science among the Students of Standard Nine.
2. To study the effectiveness of KWL Metacognitive Strategy on Metacognitive Ability among the students of Standard Nine.
3. To study the effectiveness of KWL Metacognitive Strategy on Achievement in Social Science in relation to Cognitive Styles among the Students of Standard Nine.
4. To study the effectiveness of KWL Metacognitive Strategy on Metacognitive Ability in relation to Cognitive Styles among the Students of Standard Nine.

HYPOTHESES OF THE STUDY

- ❖ H$_1$: There is a significant difference on Achievement in Social Science among the Students of Standard Nine taught through KWL Metacognitive Strategy.
- ❖ H$_2$: There is a significant difference on Metacognitive Ability among the Students of Standard Nine thought through KWL Metacognitive Strategy.

❖ H_3: There is a significant difference on Achievement in Social Science among the Students of Standard Nine taught through KWL Metacognitive Strategy in relation to Cognitive Styles.
❖ H_4: There is a significant difference on Metacognitive Ability among the Students of Standard Nine taught through KWL Metacognitive Strategy in relation to Cognitive Styles.

Independent Variables
❖ The treatment is Teaching Social Science using KWL Metacognitive Strategy.

Dependent Variable
❖ **Achievement in Social Science**: refers to the scores obtained by the students in the Achievement Test in Social Science prepared by the authors.
❖ **Metacognitive Ability**: refers to the score obtained by the students in the Metacognitive Inventory Standardized tool constructed by Dr.Punita Govil.

Population of the Study
The population consisted of all the Standard Nine Students studying in CBSE schools of Koppa Taluk, Chickamangalore district only.

Sample for the study
The sample consisted randomly selected forty students of Standard Nine studying in CBSE School, Koppa Taluk, Chickamangalore District.

Tools used in the study
❖ Instructional Material in Social Science using KWL Metacognitive Strategy on selected topic from Standard Nine Social Science CBSE text book.
❖ Standardized Test 'Cognitive Styles Inventory' constructed by Dr.Praveen Kumar Jha.
❖ Achievement test in Social Science' constructed by the authors on the basis of selected topics from Ninth Standard Social Science textbook which were considered for the treatment
❖ Standardized Test 'Metacognitive Inventory' constructed by Dr.Punita Govil.

Procedure of Data Collection
Pre-test Post-test single group design was followed in the study. The experimental procedure involved four phases as given below.

Phase I:
❖ Cognitive Style Inventory Standardized test developed by Dr.Praveen Kumar Jha was administered on the experimental group and students were classified according to their Cognitive Styles as Systematic, Integrated, Intuitive and Undifferentiated Cognitive Styles. No students were identified with Split Cognitive Style.

Phase II: Administration of Pre-tests
❖ Achievement Test in Social Science and Metacognitive Inventory were administered on the experimental group.

Phase III: Treatment
❖ The experimental group was given instruction for 15 sessions of forty five minutes duration with the specially designed instructional Material based on KWL Metacognitive Strategy prepared by authors.

Phase IV: Administration of Post- tests
❖ 'Achievement Test in Social Science' and 'Metacognitive Inventory' were administered to the experimental group.

The data obtained were analyzed and interpreted applying appropriate Statistical techniques.

Descriptive Statistics
Descriptive Statistics mainly mean, median, standard deviation, cumulative percentage of distribution was computed and graphical representations like Ogives were employed to analyze the variables of the study.

Inferential Statistics
The inferential statistics 't' test was used to test the significance of difference between the means of Pre-test and Post test on effectiveness of KWL Metacognitive Strategy on Achievement in Social Science (H_1 and H_2) and ANOVA was used to test the significance of difference (H_3 and H_4) in relation to Cognitive Styles.

FİNDİNGS AND DİSCUSSİONS OF THE STUDY
Findings of the study reveal that KWL Metacognitive Strategy is:
❖ significantly effective in enhancing the achievement in Social Science among Standard Nine Students;
❖ significantly effective in enhancing Metacognitive Ability among the Students of Standard Nine;
❖ equally effective in enhancing the Achievement in Social Science of the Students of Standard Nine in relation to Cognitive Styles and

- ❖ equally effective in enhancing the Metacognitive Ability of the Students of Standard Nine in relation to Cognitive Styles.
- ❖ Based on the findings of the present study the following recommendations are made by the authors which may assist in improving the existing practice of teaching Social Science in the Secondary School level especially for CBSE as well as the Content-Cum Methodology of teaching Social Science in the College of Teacher Education.
- ❖ Teacher could make use of KWL Metacognitive Strategy of teaching Social Science to Secondary School Students to promote achievement in Social Science.
- ❖ KWL Metacognitive Strategy of teaching should become an integral part of the methodology of teaching Social Science at Secondary level.
- ❖ Training in KWL Metacognitive Strategy to be incorporated in teacher training process. And it should form the essential part of the ongoing training and formation of the in-service and pre-service teachers under Content cum Methodology of Teaching Social Science.
- ❖ Teachers need to be trained in Preparing detailed lesson plans based on the format used in the present study and same has to be executed in the class.
- ❖ Seminars and workshops should be organised for teachers in KWL Metacognitive Strategy and the workshop should provide training for the teachers in preparation of KWL lessons in different subjects and practice of the same in their own subject in real classroom setting.
- ❖ Teacher could make use of KWL Metacognitive Strategy of teaching Social Science to Secondary School Students to promote Metacognitive Ability among Secondary School Students to enhance their achievement in Social Science.
- ❖ KWL Metacognitive Strategy of teaching should form the essential part of the pedagogy in Teacher Education.
- ❖ KWL Metacognitive Strategy irrespective of different Cognitive Styles should be integrated in the pedagogy at all levels of education to enhance the academic achievement among the students.

Review of research studies on Metacognitive Strategies and the present study reveal that Metacognitive Strategies enhance academic achievement of the students. The present study specifically reveals that KWL Metacognitive strategy is significantly effective in enhancing achievement in Social Science as well as Metacognitive Skills. Since research work on Metacognition in the Indian context is limited, intensive research need to be undertaken in general and Indian context in particular. Curriculum revision at the Teacher Education and Secondary level should be done to incorporate Metacognitive Strategy instruction in the Teacher Education and to make it an integral part of pedagogy at the Secondary School level irrespective of the Cognitive Styles of students.

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